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EDITORIAL.

MR. D. H. NEWLAND, one of the associate editors of this JOURNAL, has been appointed Assistant State Geologist of New York, and leaves us to begin his new duties forthwith. The Geological Survey of New York is a well established organization which has done much useful work, therefore the appointment is an important one. In congratulating our fellow-worker, we regret the loss of his help, but wish him the success that comes to men of ability who work with honest persistence.

THE OFFICIAL returns of iron and steel manufacture in Russia, in 1903, which have just been published, show that the depression in the trade in that country is far from its end. The decrease last year was considerable, even when compared with 1902, which was a very poor year. This was the case in spite of the orders placed by the government for railroad material and equipment, and for war material. With its great population, the production and consumption of iron in Russia is barely one-fourth that of Germany. The poverty of the country is shown by the fact that the total consumption of iron and steel last year averaged only 45 pounds per head—about one-tenth of the similar average for the United States.

WE HAVE RECEIVED a copy of the catalogue of periodical publications in the library of the American Institute of Mining Engineers; this is issued from the office of the Secretary. Besides giving a complete list of technical journals and reports now in the library, this pamphlet enumerates the missing numbers, required to make complete sets, and invites members to remedy this want. As we understand, apart from furnishing a comprehensive catalogue, it is the desire of the Council of the Institute that this and similar pamphlets descriptive of the books in the library, may enable members living at a distance, in inaccessible localities, "above timber line," as it were, to obtain extracts, or even abstracts, of literature bearing upon subjects in which they are interested. Many of us will remember buying particular books for the sake of a single accurate reference, only to find that it was a delusion; such expense, delay and disappointment can be obviated if members will write to the librarian of the Institute asking for information or help of the nature above mentioned.

THE ACTIVITY in shipping Lake iron ore in the closing weeks of the season makes it probable that there will be a sufficient supply. It looks now like an active winter for the furnaces; but the Lake Erie and South Chicago docks will have large stocks by the time navigation closes. Moreover, many furnaces still have large stocks, carried over from last year, though it is not easy to get at the exact quantity. These, with the ore now coming down, will probably prevent anything like a shortage of ore before next spring.

THE SHARP ADVANCE in the price of coke is a sign of the improvement in the iron and steel trade, in part; but much of it is also due to the anxiety of outside interests to make contracts which will secure them against a short supply during the coming year. The extension of the United States Steel Corporation's interests in the Connellsville region has alarmed the outside producers, and they are, apparently, willing to pay the higher prices, rather than to run any risks. It is quite possible that recent events may promote the building of retort oven plants at furnaces, to make coke from coal not now used for that purpose, but which is available with improved methods. In this case the control of the present coke supply by a single interest will result indirectly in benefit to the industry.

THE COMPLETE figures for the coal production of Great Britain, in 1903, include a small quantity produced from quarries, or open workings, not heretofore reported. The total was 230,334,469 long tons—or 253,030,605 short tons—an increase of only 1.4 per cent over the previous year. The quantity exported, and sent abroad for the use of steamers, was 63,805,349 tons, or 28 per cent of the total. The coal retained in the country was equal to an annual consumption of 3.93 tons per capita for the population of the country.

THE LOUISIANA Purchase Exposition at St. Louis closes this week, after what may be regarded as a successful life of six months. In several points it was undoubtedly superior to any preceding exposition of the kind, and the management has been, generally speaking, above serious criticism. In the mining section, which especially concerns our readers, the collection of exhibits was the best ever brought together, and this, we believe, will be the verdict of those who have had opportunities of comparison. The most serious defect was the absence of any illustration of iron and steel metallurgy, as practiced in the great plants of the United States Steel Corporation; and this was not the fault of those in charge of the Exposition. Apart from the general illustration of the abundant mineral resources of the United States, and of the advances in the construction of mining machinery, the two most striking exhibits were the showing made by the Philippine Commission of the mineral possibilities of the Islands, which are just beginning to be prospected and brought to light, and the wonderfully well-ordered and instructive exhibit of the mining and metallurgical industries of Japan.

Some of the investigations started at the Exposition are to be continued. Among these the most prominent is the coal-testing plant, which is now well started in work that promises to be of great value.

It is probable that St. Louis has had, if not the last great exposition, a greater one than we shall see for many years to come. The Lewis & Clarke Centennial, to be held at Portland, Oregon, next year, will be of special interest to the Pacific Coast; but it is not expected to be on so large a scale, or of so wide a scope as the one just closed.

THE REPORT of mine accidents in Indiana, given on another page, agrees with the Pennsylvania report recently published as to the large number of casualties resulting from falls of roof, slate or coal. While such accidents are not often noticed, since they usually kill only one or two at a time, the total number is really formidable. It is true also, as Mr. Roderick points out in the Pennsylvania report, that the majority of these might be avoided by proper precautions on the part of mine operators, and by greater care on the part of the miners themselves. Both classes are to blame, and both will have to co-operate in order to secure a reduction in the death-rate from this cause. It is an important subject, and ought to receive much more attention than it has, up to the present time.

ON ANOTHER page will be found an article on the recovery of zinc at Broken Hill. The author of this article wields a practiced pen, the ability of which is evidenced in the clear presentation of an interesting set of conditions. Broken Hill is one of the great exploitations achieved by man—662,000 tons of lead, 4,500 tons of copper, and, mark you, 3,524 *tons* of silver and 2½ *tons* of gold, make an aggregate of metallic output the magnitude of which is enhanced by the short period—20 years—consumed in the achievement. Mr. Bathurst emphasizes the big stores of zinc existing both in the mines and in the dumps at Broken Hill. At the present time the ore mined in this district represents an output of 200,000 tons of metallic zinc per annum. The success of the Delprat and Potter processes indicates that much of this can be profitably extracted. As the world's production is about 563,000 tons of zinc, it can be seen what a relation this would bear to the metal market. Apart, however, from the material now being mined, there are the accumulated residues from previous operations, aggregating no less than 5,000,000 tons of material averaging 18 per cent zinc. It will be a relief to metal merchants to know that the companies operating at Broken Hill intend to make an agreement limiting their production of this metal, which has been for so long a hindrance in the realization of their mineral wealth.

MEXICAN CURRENCY.

Our readers will remember that, a little over a year ago, considerable discussion arose on the question of adjusting the currency in Mexico, with a view of securing a more stable value for the silver dollar in that country, and, if possible, a fixed rate of exchange. The matter at that time was postponed; it is intimated that this was done in order to permit the adjustment of important investments of outside capital in the country, without the immediate loss which would have followed had the plan then been adopted. Recently, however, a bill was presented in the Mexican Congress, empowering the Executive to amend the monetary laws of the Republic, by making "the present silver dollar, containing 24.4391 grams of pure silver, . . . unlimited legal tender," and by ascribing to it "a value equivalent to 75 centigrams of pure gold." This would give the Mexican dollar a value equivalent to 50 cents, American money. The bill further prohibits practically the importation of Mexican silver dollars into the territory of the Republic, by imposing an import duty. This, naturally, would reduce the value of the Mexican dollar in other countries by the amount of the duty, so far as the exchange with Mexico is concerned. It may not have this result, however, since the principal value of the Mexican coin consists in its extensive use as a current coin and—to a certain extent—a standard of value in China and other eastern countries. The bill permits an alternative by allowing the coinage of a dollar of different, or special, design for export only. Should this be done, the special coin would be free from export and import duties. Should the proposed plan be adopted and proclaimed by the Executive, which will be necessary to put it in force, there would be practically a free coinage of silver for export purposes, while, at the same time, the amount of silver dollars in circulation in the country would be limited by the tax, which would prevent the re-importation of Mexican coins into the country. The special export dollar, if coined, would not be available for home circulation.

The whole plan proposed by the bill is equivalent to a measure putting Mexico on a gold basis, at the ratio of 32 to 1. It is very probable that, after the fluctuations which will necessarily attend the putting of the new measure into force, exchange will be established on an almost stable basis, very much as the fluctuations in value of the Indian rupee have been reduced to a small amount. The export dollars, of course, will be treated practically as merchandise, being simply silver put

into a convenient form for use abroad, and having a special value resulting from their currency in the East.

THE STEEL CORPORATION'S SHARE.

The statistics recently published by Mr. James M. Swank, of the American Iron & Steel Association, contained an interesting comparison, showing the proportion of the iron and steel output of the United States which is made by the United States Steel Corporation. In the important and basic industry of mining iron ore, we find that the Corporation's mines in 1903 produced 15,363,355 tons of ore altogether, of which 14,293,083 tons were from the Lake Superior region. This output is 43.8 per cent of the total ore mined, and 58.8 per cent of the production of the Lake Superior mines; that is, the Steel Corporation produced in an off year nearly 60 per cent of the Lake ore, while it is well known that it controls over two-thirds of the possible producers in that region. The comparatively small proportion of the total is due to the fact that the Corporation has no holdings in the Southern district, which is the largest producer next to the Lake region. The production of coke from the mines and ovens controlled amounted to 8,658,391 tons, or 34.2 per cent of the total. This proportion will be considerably increased during the current year, owing to the purchase of additional producing capacity.

The following table shows the production of pig iron, of steel ingots, and of finished iron and steel products by the United States Steel Corporation, with the proportion of each to the total output of the United States:

	Tons.	Per cent.
Pig iron	7,123,053	39.9
Spiegeleisen and ferro-manganese	156,188	81.0
Total furnace products	7,279,241	40.4
Bessemer steel	6,191,660	72.0
Open-hearth steel	2,976,300	51.0
Total steel	9,167,960	63.5
Rails	1,934,315	65.6
Structural steel	660,978	60.3
Plates and sheets	1,557,223	59.9
Wire-rods	1,100,290	73.1
Bars and other products	1,510,085	29.8
Total rolled iron and steel	6,762,891	51.2
Wire nails	303,624	70.6

The percentages given in this table show that the Corporation's producing capacity is weakest in pig iron. Last year it made only 40.4 per cent of the total, and was obliged to buy a considerable quantity from outside furnaces. This comparatively low proportion, however, is in part accounted for by the fact that the furnaces owned are run almost entirely on basic and bessemer pig, and furnish comparatively little of the large production of foundry and forge iron. In steel, however, we find that over five-eighths of the total was made by the converters and open-hearth furnaces owned by the Corporation, and this proportion could be slightly increased in a busier year; in fact, it will be increased in the current year, owing to the recent purchase of the Clairton and other properties.

In rolled and finished products, we find that the Steel Corporation made a little over one-half. The proportion of the total is considerably reduced by the fact that by far the greater part of the iron bars and of the nail-plate and cut nails is made by the Republic Iron & Steel and other independent companies. If we exclude these wrought-iron products and count steel only, the proportion of finished products turned out was fully equal to that of the steel ingots.

It seems probable, taking into account additions to property and other considerations, that the Steel Corporation in 1904 will control fully two-thirds of the output of finished steel and more than two-thirds of the iron ore production, while its pig iron will reach fully one-half of the total. It must be remembered also that many of the contracts with outside furnaces include the supply of ore, so that the iron made is not really controlled by the makers, or on the open market.

EQUIPMENT AND ORE RESERVES.—V.

The discussion on the proper ratio between mine equipment and ore reserves is taken up again in this issue by an engineer whose experience gives special value to his observations. Previous contributions on this subject have brought out two points of view, which naturally enough are held to represent the opposite standpoints of financial surety and practical mining; the one asks for the maximum security consistent with a reasonable rate of interest; the other demands the largest gain in the least time. Mr. Curle's now famous requirement of a 60-per-cent reserve represents the investment view; while Mr. Hoover's insistence on the increment of profit due to rapidity of extraction expresses the intention to get the largest amount of money out of a given body of ore. As a matter of fact, any discussion of these differences of opinion will continue to be at cross purposes until it is realized that only one form of ownership is contemplated, namely, that of a limited liability company, organized and conducted under certain recognized conditions. If the mine is owned by an individual who has no intention of selling it, the problem is simplified; there is no share quotation to maintain, no diversity of interests to please, no directors to educate, and no financial press to consider. It becomes simply a question of logical method, striving to make the most money out of the ore deposit; the aim will be to avoid the wastefulness of an extraction so slow as to allow ore reserves to remain underground unrealized while fixed charges consume small profits, or the extravagance of an exploitation under which the increment of profit due to rapidity of extraction becomes overwhelmed by the interest to be paid on an equipment the services of which are soon ended by the exhaustion of the mine. The fact is, we do not quite appreciate how much our methods are dominated by the fluctuating ownership of mines; shareholders form a dissolving body of proprietors the interests of whom are divergent according as they have bought as investors, to hold indefinitely, or as speculators, to sell on the next rise.

To the investor, ore reserves are an insurance; and, even though the opening up of an excessive area of ore-bearing ground represents the expenditure of capital not immediately remunerative, he feels that the added expense is worth the additional security. The speculator buys to hold for a time, until he has a reasonable profit; but in any event he does not contemplate retaining his holding until the bitter end—when the mine is worked out. To him completeness of equipment with capacity to extract rapidly, at least as rapidly as the opening up of new ground, affords the results most to his liking—a rising quotation, an increased dividend, and a proximate disposal of his holding at an enhanced price.

We can illustrate this view of the matter by quoting the case of a company which carries a year's output in the shape of broken ore; apart from reserves in the form of blocks of ground not yet mined, there is this big tonnage of ore already mined lying in the stopes. From the investor's standpoint—Mr. Curle's—this is insurance of the best kind; for obviously ore actually stoped, sampled and assayed can be appraised with an accuracy not possible when it is in place in the lode. As the speculating shareholder sees it—as Mr. Hoover would regard it—this is just so much money lying idle underground, on which not only is there no interest forthcoming, but it requires a constant, though small, expenditure in the way of maintenance—that is, timbering, ladderways, tracks, etc. It is here that we disagree with Mr. Curle—sound as his views are on most matters of mining finance. We consider that mining cannot be safeguarded to the extent of eliminating risk; or rather, we repudiate the idea that by demanding a certain ratio of ore reserves and a specified rate of dividend, you can make a mining investment as safe as a railroad bond. By vigorous development, by accumulating broken ore, and by enlarging the bins you decrease the uncertainty; but the risk remains—it is the essence of mining. Therefore, the increased equipment and the faster extraction—with the concurrent advance of development, a larger dividend and a smaller ore reserve—represent the soundest kind of mining. Under company management, that rate of extraction, in which, as Mr. Hoover claims, the increment of profit due to enlarged equipment balances the amortization of the additional capital invested in the equipment, gives the fluctuating ownership the best return. If this is accompanied by accurate periodical estimates of reserves, a frank and frequent record of progress, and a management which does not buy or sell the shares of the mine under its direction, there is achieved the most profitable form of business known to the modern world.

MINING DIVIDENDS.

The November dividend payments, amounting to $10,665,886, as reported to THE ENGINEERING AND MINING JOURNAL by 46 mining and metallurgical companies in the United States, show a substantial increase over previous months. Favored by higher prices for the commercial metals and a continued improvement in general business, the earnings of many companies have increased. By far the greater number of dividends are declared monthly or quarterly, and it is evident that many managers of low-grade gold and silver mines approve of the policy of sharing profits at short intervals. In some cases, however, it would seem judicious to enlarge the reserve against depreciation of property and plant with a view to repaying the capital invested and a satisfactory interest, instead of sharing profits that in the end will total far less than the authorized capitalization of the company. In November, 18 gold, silver and lead properties declared $662,740 in dividends; four copper companies, $1,681,340, and two zinc mines, $300,750, making a total of 24 companies with $2,644,920. Nearly three times this amount was paid to the preferred shareholders of the United States Steel Corporation, being a quarterly dividend of $6,304,919, or 1.75 per cent on par. Two other iron and steel companies distributed $593,709. Two coal and coke companies announced $509,633; 15 oil and gas, $514,955, and two miscellaneous companies, $97,750. In all, 22 industrial corporations paid dividends of $8,020,966, which, added to the profits shared by the 24 mines, totals $10,665,686 for the month.

One Central American mine paid $15,000, and one Mexican, $45,750, both dividends being shared with American investors.

THE METAL MARKETS continue to show great activity and firmness in prices. Home demand for copper continues very good, and foreign demand is also good, although there has been a slight holding up in export orders. For other metals the demand is also strong. Spelter, especially, is firm. Silver continues to show a steady demand, with very slight fluctuations in price.

The iron markets continue strong, with abundant orders for future delivery, both in pig iron and in steel. In the finished products, however, there is some variation, the demand for structural material being the most uncertain. The rail question for the coming year is not yet settled, and probably will not be finally adjusted until negotiations with the Lackawanna Steel Company are completed.

The coal trade, east and west, is generally in good condition, demand for steam coal showing improvement, though domestic trade is rather backward.

The end of the year is approaching when manufacturers take stock, so that it will be only natural if December should show a lull in trade.

SECRET RESERVES.

In regard to this matter, which was discussed in our editorial columns last week, it is interesting to note the views of four leading mine managers at Kalgoorlie, as elicited by a Royal Commission which is probing the Boulder Perseverance scandal.

In course of his evidence, Mr. Richard Hamilton, manager of the Great Boulder Proprietary, deposed on oath: It is the custom of most of the mines here to have a bullion reserve. I think it is very advisable to have one to keep the returns even; it prevents fluctuations in the market, and enables you to work the mine cheaper. If you had to keep the returns even by taking the ore out of the mine, you would not be able to do straightforward stoping. The amount of the bullion reserve should depend upon the character of the mine, but half a month's return would be a fair thing. Our reserve is kept locally. If you did not keep a reserve you might have a 25 per cent or 30 per cent variation; such a fluctuation would affect the market probably to the detriment of the shareholders. I am in favor of limiting the reserve to half the month's output. The bullion reserve does not show in the yearly balance-sheet in every case; the control of the bullion reserve is generally left to the manager. I have not had any definite instructions to keep up a normal output. The directors do not always know of the bullion reserve. The Chamber of Mines has recommended that bullion reserves be kept, but with no limitations as to the amount. I am in favor of giving every opportunity to shareholders of acquiring information about the mines; I would not let them know what the bullion reserve was. I think developments should be announced here simultaneously with London; I would also give publicity to the assay plans, and would withhold nothing but the bullion reserve. I do not see that it is necessary to have local directors; those who subscribe the capital naturally want control of the mine. There does not seem to be a very large body of investors in Western Australia; Westralia would derive greater benefit by having the mine offices where the capital is available. I do not think you require any more legislation than you have at present to prevent mining scandals; Royal commissions, such as the present, would act as a greater deterrent than in enacting fresh legislation. Mr. Hamilton gave a description of his sampling methods, saying he generally took samples not more than 10 ft. apart.

Mr. Robert B. Nicholson, the manager of the Ivanhoe, in course of his statement, said: I am in favor of a bullion reserve. In a mine like the Ivanhoe it is quite possible to have a variation of 25 per cent in the output, and that would be detrimental to investing shareholders. In a mine like the Ivanhoe, where we get slides, the fluctuations are considerable. I think 75 per cent of the month's output is a fair thing for a bullion reserve. The directors know exactly what the output is; it is not desirable to let the shareholders know the actual figures. The bullion reserve is merely to regulate the monthly output. Two of the officials on the mine besides myself know what the reserve is. The holding of the reserve makes the costs of mining cheaper; for instance, you would leave a lot of low-grade stuff behind you if you had no bullion reserve to work on. Mr. Nicholson, in describing the sampling practice on his mine, said he took assays every 3 ft., cutting everything above 5 oz. down to that figure in calculating averages. He continued: I think the public generally should have access to the mine. They have access to the Ivanhoe; we will show them the assay plans up to the date they are received in London; we publish all information here simultaneously with London. I do not think it would be wise to legislate that ore reserves should only be those opened up on three sides; it should be left to the discretion of the manager. What is really wanted is the publishing here of the fortnightly reports, giving widths and values; we do it on the Ivanhoe.

Mr. Frank A. Moss, general manager of the Kalgurli and Hainault, deposed: The Kalgurli differs from most mines on the field. We have very big lodes, but no definite line of lode, and unless we had a bullion reserve we would have a bad time. (Witness produced a plan showing a stope 190 ft. long and 132 ft. wide, and explained to the Commission that in working such a big orebody it was impossible to maintain an even return.) In January our output was 5,800 oz.; probably six months later it would be 2,800 oz. Still, our shares never fluctuate, and that is due to the use of a bullion reserve; a month's bullion reserve is quite sufficient for us to maintain an even output. We do not expose ore on three sides in our mine; we go by what we have taken out. Supposing we take 20,000 tons out from 20 ft. in height, and it goes 17 dwt., we reckon the next 20 ft. should be something the same. No hard-and-fast rule as regards estimating ore reserves would apply to the Kalgurli. We have a stope 65 ft. wide at 640 ft., and at 700 ft. it is 5 ft. wide; 80 ft. south of that it is 80 ft. wide at the 700 ft. My estimates, so far, have worked out correctly. If any persons wanted to sample the Kalgurli it would take them twelve months; they would have to shoot the stopes out to do it. In the Kalgurli I would not take samples even in 5-ft. sections; for instance, in one face we may be on 10-dwt. ore, and the next cut might give us 5 oz. My instructions are that the mine plans, assays, etc., are to be open to the public.

Mr. George M. Roberts, manager of the Associated Northern Blocks, deposed: I think it is essential to have a bullion reserve equal to half the month's output; values in these mines are very erratic; in the event of legislation I would say a month's reserve. There are about 200 ft. of country in our mine, ore-bearing, carrying lenses of ore; face samples are very misleading in our case, and it is a difficult mine to reckon up the ore reserves. I would not make even a preliminary report on samples taken 50 ft. apart; it would be useless. I would like to sample at least every 10 ft., and then compare my results with the mine assays; if I were buying a mine I would sample every 5 ft. I am in favor of a mine being worked openly; our mine has been open to the public ever since I took charge. I consider the keeping of a bullion reserve assists us in cheap mining.

With the recent completion of pipe-lines from Kansas and Indian Territory to Kansas City, it is stated that the Standard Oil Company has now a continuous pipe system reaching from the regions mentioned above to the Atlantic Coast.

Molybdenum carbide, MoC, is probably present in molybdenum steel as a double carbide.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

MINE SAMPLING.

The Editor:

Sir—In your issue of September 8 is a description of a sampling box. I did not take part in the discussion on mine sampling which appeared in the JOURNAL last year, but it has been a source of wonder to me why none of your able contributors has hit upon the simple expedient which was brought to my attention as long ago as 1897.

Personally I think that a box of any sort in mine sampling is an abomination, that seems to get in the way of one's fingers with resulting injury to those most necessary members. My experience is that when sampling wet places acid water is likely to drip on skinned knuckles with consequences by no means pleasant. Holding a candle-box or any other kind of non-flexible receptacle with sharp edges, in a tight corner, especially with hard ore, can only result in one of two things: If the box is held far enough off, so that one can see what is coming away, nine chances out of ten the chips will fly clear of the box altogether, or if the box is held close up, neither the sampler nor his assistant can see what is going on and the sample is therefore apt to be inaccurate.

Many of us have been in places where neither a candle-box nor any other kind of a box was obtainable. I recall a trip I made a few years ago in Mexico to examine a group of long-abandoned lead mines, 80 miles off the railway, but since brought within easy reach of modern transportation. The trip was across the desert and the nearest collection of dwellings was 15 miles distant. Left without the usual candle-box, I should have had to make shift of a canvas; that a canvas does not always answer has often been pointed out. However, I had provided myself with two collapsible camp water-buckets, made of strong, closely-woven canvas and weighing about a half pound each. These buckets are made over a ring of ¼ in. iron, 9 to 12 in. diam., and are about 15 in. deep, with a canvas bottom of the same diameter as the ring, which serves as a mouth, and having a bail or handle made of ¼ in. rope. The whole thing looks very much like an ordinary nose- or feed-bag for horses, such as is to be seen in our American streets. They possess what I consider are the two essentials for such a device, namely, lightness and flexibility. They can be gotten into any corner. The mouth can be turned conveniently to any angle, to catch the chippings as they fall, without upsetting the contents of the bag. They avoid the discomfiture often experienced, when holding even an empty box in an awkward position. Another point is that, as they do not take up so much room in inconvenient places, they allow the sampler to get closer to his work. When finished with one sample they can be turned inside out and brushed clean.

The canvas bucket is not only superior to the box in this respect, but on the score of size it can be made with as wide a mouth as wanted. On the whole, I consider the candle box apt to give faulty results, on account of the joints between the sides and bottom, the cracks between the boards and the burr on the unplaned boards, which are more apt to retain fine gold than canvas. Further, if the ore is wet, it is difficult to get the box clean after finishing the sample. In a similar case with a canvas bucket, it can be turned inside out, and if it can not be brushed clean a little water will serve to wash it. I have used the canvas bucket continuously since 1897 in all parts of the world and never travel without several in my outfit. I have recommended it to a number of my friends, who report unfailing good results. Any sail- and tent-maker can make it; it is inexpensive and, being collapsible, it can be stowed away inside the usual mailsack when not in use.

C. S. HERZIG.

Rangoon, Burma, Oct. 22, 1904.

MINE EQUIPMENT AND ORE RESERVES.

The Editor:

Sir—If a few words, rather late in the day, can be granted me, I would like to submit a consideration of the difference between the policy advocated by Mr. Hoover and that urged by Mr. Curle. This difference is partly fundamental and, in part, one of premises. Mr. Hoover says: "It will be granted that the true objective of mining is to gain the greatest profit from a given body of ore." Mr. Curle, using mining as a generic term, embracing finance as well as practical management, answers "that the greatest technical economy is one thing and financial security another, that high-pressure development and the economic limit of reserves, while satisfying the one, are in contravention of basal principles of the other," and further, that capital being the first essential of operations, "those who pay the piper must call the tune."

This assumption of the opposition of practical mining and finance is so much of a facer for those engineers who are trying to reach the most economical basis of operations that it is worth our while to examine the matter with some closeness.

There is no dispute in this case about the economy to be effected by Mr. Hoover's policy of forced development and unit-plant additions. The financial argument against it is that, while increasing profits, it decreases ore reserves, and tends to keep them at about a three years' limit. The investor looks upon ore reserves as the security for his investment, and feels that he has little enough of that if he allows two-fifths of his capital (Mr. Curle's ratio) to stand without that security. In other words, under normal conditions of bottom development he asks that for every $100 of stock valuation there should be $60 of actual profit in reserve; then, if the mine be paying 10 per cent on that valuation, there would be six years' dividends assured in the reserves.

The addition of further treatment units may, through the increment of profits, increase the net value of the reserves by 20 per cent and the annual dividends by 100 per cent. The increased dividend rate, moreover, has the effect of raising the stock valuation as well, by perhaps 100 per cent, while the ore reserves, in point of time, are diminished by half. I think this states the argument fairly.

For the original investors, those who bought on the $100 basis, on which the property was paying its 10 per cent dividend, there seems to be no question that the secondary equipment has been a financial gain, regardless of the increased stock valuation, and it is hard to see what in the condition of the mine should tempt them to sell even at the enhanced price; by so doing they would be sacrificing a high return investment, and one that actually exceeded the three-fifths profit in ore reserves, and could scarcely hope to re-invest their increased capital on as good terms as that. This in itself would tend to strengthen the investment view of mines, and weaken the speculative.

It may be granted, however, that some would sell, and the new holders would have a 10 per cent investment, as the original holders had, but through the short life of the mine they might, by failure of subsequent development, lose part of their capital. The question is whether this ought to be considered in deciding on the secondary plant; should the present stockholders be sacrificed in pocket because of some possible people who may buy the shares later?

Stated in this way, the question implies its answer, and I can see no reason why either the management or the directory, who are expressly chosen by the present stockholders to look after their interests, should have any doubts in the matter. We may all be sorry for excitable and short-sighted investors, and look forward to the time when a clearer view of what constitutes value in a mine will obtain—may even exert ourselves, as Mr. Curle so successfully has done—to bring the time nearer; but this is entirely irrespective of present policy. In short, it seems to me absurd to hesitate about lighting a fire in A's stove because B may burn his fingers at it; rather the clear-seeing economist should argue that some time B must learn all about fires, and the sooner he is scotched the sooner will he become enlightened.

Perhaps Mr. Curle would argue the hopelessness of expecting people to sell a share yielding an annual $20 for $100, even though, on Mr. Curle's basis, it lacks security. This may be true, but does not this simply indicate that the layman does not accept that formula of chances? And in the absence of the geological and historical data that would give the best evidence obtainable of the future of the mine, or, perhaps, because of inability to understand them, he believes he can have no safer guide than his experience in other investments, and, according to what that has been, he capitalizes the particular profit. This is not saying that, as an expression of averages, Mr. Curle's formula is not sound; we are considering it as applicable to particular cases, and for such, statements of averages are of doubtful value—one cannot predicate a man's height from the mean of the human race.

In conclusion, may I be allowed to point out that the term 'insurance' is not safely applied to what security may be obtained from large ore reserves, as distinct from 'economic' ones. Insurance is a definite security for which a definite premium is paid; in this case, the security is indeterminate and the premium depends upon the increment of profit, which is the sum actually sacrificed for the security by insisting upon the two-thirds rule. This varies from dollars to thousands; but, whatever it may be, it is an unknown quantity unless the investor is awake to the function of 'fixed charges' and understands the 'increment of profits.' When this degree of knowledge has been reached, it is not a far step to a technical view of the real prospects of a mine as distinct from the average view, and knowledge on this point removes the need for the use of the two-thirds rule.

What I have wished particularly to make clear is that the two-thirds rule with its con-

sequences does not tend to a rational treatment of mining investments; that it does not of necessity make for the less speculative view of the industry; that it does not even invite the best class of investors, those who will try to understand the needs of the business.

R. GILMAN BROWN.

Bodie, Cal., Nov. 9, 1904.

THE EXTRALATERAL RIGHT.

The Editor:

Sir—Herein is briefly described a vein system known as the 'West Fisher,' situated in Montana, which some time since came to my attention. Probably there are many similar instances in diverse parts of the United States, and this example will therefore serve as an illustration of this class of deposit.

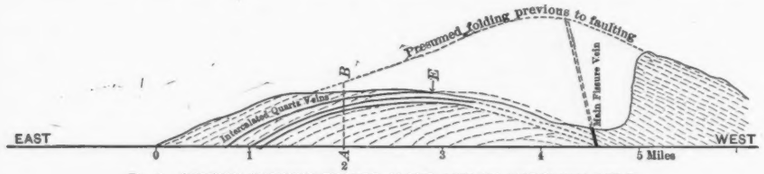


Fig. 1. SECTION SHOWING FISSURE ALONG AXIS OF ANTICLINAL FOLD WITH LATERAL INTERCALATED VEINS.

It will be seen from Fig. 1 that, for the most part, the veins occur as sheets or beds of quartz, cutting at a slight angle across the bedding of the shale, which has been formed into an anticlinal fold. Although the connection has not been actually traced, still the general inference points to these veins as being lateral extensions emanating from the main vein of the district, which is traceable for some 40 miles. It would appear, therefore, from the evidence of this geological structure that the shale and banded limestone over a considerable area have been folded—probably from the effects of intrusive granite, which is in evidence in the vicinity—into a series of anticlines and synclines, culminating in the uplift of the sedimentaries, as sketched.

Probably a fracture occurred along the axis of the fold, and the eastern leg then appears to have suffered a considerable downthrow or fault. The western leg remains *in situ*, although it has suffered severe erosion. It stands 3,000 to 5,000 ft. in altitude above the datum line, equivalent to 8,000 or 10,000 ft. above sea-level.

Through fractures in the shale of the eastern leg—either before or after the supposed faulting—that followed, more or less closely the bedding planes, silicious waters coursed, indurating the shale and forming intercalated quartz sheets, sometimes 12 ft. in thickness.

Subsequently, through glacial erosion—for the rudimentary glaciers still exist in these mountains—valleys were eroded, and, in consequence, parts of the quartz sheets were displaced, originating the extensive gold placers found along the several creeks.

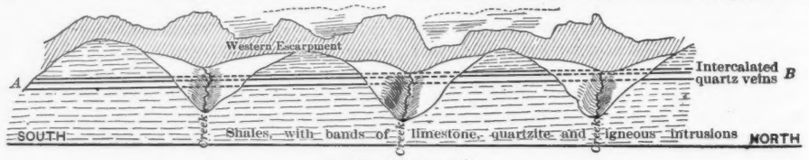
To these exposed vein surfaces, then, came prospectors, and, seeing the veins lying on the sides of the steep hills, they staked them out—almost invariably with the side-lines parallel to the outcrops—claiming that these eroded surfaces were the apices of the several veins. Others followed in their steps, and eventually the entire district was staked, mostly in the manner of the first locations, as shown at C and D in Fig. 3.

Claim E, as seen in Fig. 1, was originally staked with side-lines parallel to those of C and D, and is seen to contain an exposure along the strike of the upper vein. Assuming, therefore, it were possible to amend this location, as shown in Fig. 3, and that, in addition, this was the first claim staked, the side-lines would then be parallel with the exposure at surface, which is, in fact, the apex—as being the highest exposure along the strike of the vein; it would then be possible to follow the vein beyond its side-lines eastward. In claim C, however, which, we will say, was the second located, the vein exposure along its dip was taken as the apex, and the slight 'pitch' of the vein was termed its dip; consequently, this claim would, by virtue of the extralateral right, continue to follow its vein past its side-line southward. Then, lastly, D, located on the other side of the mountain, would at least claim all within its four stakes projected vertically; but if, as a matter of fact, it actually was the identical vein said to have its apex in C, then the ownership of D claim, sooner or later, would be doubtful.

Finally, the E claim, which, geologically speaking, undoubtedly possesses the real apex, would follow its vein eastward past its side-lines, by right of the extralateral right, until, finally, the continuity of the vein was traced to C and D, when both properties might be claimed under the right, and, in addition, all of the vein exposed in the section given—a matter of two miles or so—and as this claim possesses the buried apices of both lower veins, there would seem nothing to prevent a plausible claim to the two latter veins both east and west, an exposure of almost four miles.

Geologically, there can be no doubt as to the strike, dip and pitch of these sheets. The strike corresponds with the parent fissure running north and south—the dip is east, and the veins have a slight pitch southerly. The prospector can surmise as much as he pleases, and call an eroded exposure along the dip of the vein the apex, but that does not alter the fact geologically that it is in reality but an exposure in one of nature's colossal sections, and it is presumed that what is scientifically demonstrable is accepted in finality at point of law.

It would therefore appear, if the statement herein is a correct interpretation of natural phenomena, that all such claims located as C and D are in danger of litigation in the future, should their value prove sufficiently alluring.



SECTION ACROSS *A-B*

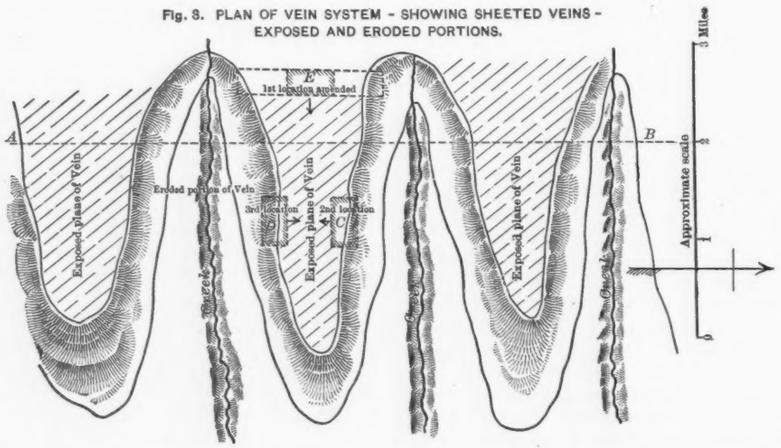
Fig. 2. SKETCH SHOWING SECTION THROUGH ERODED UPLIFT AND INTERCALATED SHEETS BROKEN BY GLACIAL ACTION.

Be this as it may, if the data given are accepted as a correct statement, is the application of the law of extralateral right likely to prove advantageous to either the prospector or the mine owner in this particular instance, which, as before suggested, is probably typical of many another similar occurrence? This law would rather tend to cast doubt on the validity of all such claims, of which there are some hundreds, located as claims C and D in sketch 3.

The fact that in the middle portion of the anticlinal fold the veins are almost flat, and are known as 'blanket-veins,' does not affect the point at issue in the slightest, since all such veins, whatever they may be termed, must come under one and the same law relative to their lateral extension.

The real issue is, whether the actual and assumed geological evidence and deduction is so incontestible as to prove more valid than the hasty and ill-considered surmises of the early prospectors, who, seeing an exposed vein on the mountain side, interpreted it as an apex, and staked their claims accordingly, when in reality that exposure was simply the result of titanic forces and a prodigality of time, that had eroded the portions now forming the valleys, and leaving almost the entire dip of the veins exposed, as would be shown by a glass model of the end section of some well developed mine.

Fig. 3. PLAN OF VEIN SYSTEM - SHOWING SHEETED VEINS - EXPOSED AND ERODED PORTIONS.



This, then, is given as an instance of an ore occurrence capable of profitable and peaceful development by the exploitation of the vertical plane quadrilateral; but, by the enforced application of the extralateral-right law, one capable of providing endless contentions of doubtful interpretation, and with results that can be but injurious to the community. Truly, a measure that may well be heralded in the portentous lines of the Elizabethan bard: "Shall in these confines with a lion's voice cry 'Havoc!' and let slip the dogs of LAW."

Oct. 4, 1904. H. E. W.

BLAST FURNACES AT ANACONDA.

The Editor:

Sir—Referring to your issue of November 17, 1904, under the head of 'Metallics,' you say, "Running a blast-furnace in connection with a converter plant of the size of the one at Anaconda, Montana, where the sole purpose is to work up refuse material and to smelt over converter slag, is a much simpler operation than smelting ores, which are widely different in character, and only mixed mechanically in the charge."

In view of the fact that the blast-furnace charge at Anaconda contains approximately 45 per cent of raw ores, ranging from 30 to 70 per cent in silica, with the other constituents varying correspondingly, and the refuse materials and converter slag in the charge averaging only about 15 per cent, it would seem that the above quoted item from 'Metallics' is incorrect.

S. J. GORMLY,
Superintendent Blast-Furnace Dep't.

Anaconda, Mont., Nov. 22, 1904.

THE GOLD MINES OF MINAS, BRAZIL.

The Editor:

Sir—In the October 6th issue of your JOURNAL I have read with considerable interest the article by Mr. Martin Schwerin on the 'Gold Mines of Minas, Brazil.' As a representative both of investors who have large interests in producing gold mines, and of intending investors, I take exception to one point which Mr. Schwerin especially emphasizes in the above-mentioned article. It is in reference to crediting the support of the city of Ouro Preto, former capital of Minas, to the prosperity of these ancient gold mines.

From statistics at hand I find that for one hundred years prior to 1850 diamond mining had been carried on to a profit in the Minas Geraes province of Brazil, during which time, as Edwin W. Steeter states in his well-known book on 'Precious Stones and Gems,' "over fifty million dollars had been realized." But the diamond fields of Bahia being richer had attracted twenty-five thousand people. (This was the beginning of the commercial decline of the Minas province.) The discovery of South African diamonds in 1867 proved to be so much more profitable that the Brazilian diamond miners could not carry on an extensive trade."

It is my impression that the industry of diamond mining of this district has been the most prominent factor in creating and reducing its population. ALASKA MINER.

Seattle, Wash., Nov. 18, 1904.

All chemical reactions are not practically reversible in the sense of the ideal thermodynamic engine, but the changes represented in the storage battery well illustrate reversible reactions.

OBSERVATIONS ON MAGNETISM.

A remarkable series of magnetic alloys made from non-magnetic metals has been prepared by R. A. Hadfield. The metals include copper, aluminum and manganese. The magnetic property seems to be due to manganese; yet in a series of alloys, with constant manganese, the magnetism increases with increasing aluminum, to a maximum when the latter amounts to about half that of the manganese. Those, who are familiar with the general principles of the periodic sequence of the elements, will not be surprised at this interesting discovery. Chromium, the next lower neighbor of manganese, is already quoted in the books as forming a magnetic salt-oxide where the metal is in two stages of oxidation; the compound being described as a translucent, crystalline substance. Copper is a 'local' neighbor of iron. Moreover, aluminum is found at a point in the atomic volume curve of its series where it is liable to claim some of the general magnetic properties of the endo-serial group of iron, cobalt, and nickel. But of all the surprising facts connected with the manifestation of this mysterious power of attraction, perhaps nothing could be more surprising than the magnetic properties of liquid oxygen. This is a phenomenon which was not anticipated. With the production of these new magnetic alloys of copper, aluminum and manganese, we are prepared for almost anything as possible in the field of comparative dia-magnetism and para-magnetism, a field which seems to lie temptingly open for research and for use. Evidently magnetism is not the exclusive possession of the iron metals.

While it is not yet possible to frame any generalization as to the nature of magnetism in its relation to chemical affinity, yet there are some observations now available which are decidedly in point. The ready but temporary magnetizability of soft iron, the more reluctant but more permanent tendency of steel in the same direction, and the loss of magnetic property on heating iron—these three great facts indicate the inherent connection of the chemical substance iron with the physical property magnetism. Moreover magnetite, Fe_3O_4, is inherently magnetic, just as gold is inherently yellow, and water is inherently wet. It requires no contact with a magnet, nor with a dynamo, nor with any other artificial magnetic field to induce in magnetite, Fe_3O_4, the properties of magnetism—it is so by nature—by reason of existing in the great magnetic ocean which floods the universe. Now magnetite, Fe_3O_4, is a compound—and a very stable one, indeed a kind of a salt—of ferrous and ferric oxide. Note the German name for magnetite — *eisenoxyd-oxydul*, ferric-ferrous oxide. Therefore it can be called a 'salt-oxide' and may be written $Fe^{II}\,O.\,Fe^{III}{}_2O_3$, or $Fe^{II}\,(Fe^{III}O_2)_2$, that is, a ferrous meta-ferrite, where the ferrous iron acts the basic part and the ferric iron the acid part of the salt. This presents a remarkable condition of things, namely, a molecule containing the same element in two different stages of oxidation. The molecule $Fe^{II}\,(Fe^{III}O_2)_2$ is chemically polarized; what wonder therefore that the iron should exhibit, not only an internal molecular polarity, but also an external molar magnetic polarity? The iron seems inherently to possess a structure which is keyed to the ethereal drift tension, which we call electro-magnetism. Now if magnetite can place, in one molecule, three atoms of iron in such adjustment that one atom is in a 'dyad' or lower state of oxidation, and the other two atoms are in the 'triad' or higher state of oxidation, amounting to chemical and, apparently, to almost synonymous magnetic polarity—have we not here a possible key to the explanation of the curious magnetic alloys—manganese, aluminum and copper? The peculiar function of aluminum in these alloys, and its equally peculiar locus in the atomic volume curve (where aluminum and not silicon stands at the maximum of atomic gravity of its series)—these suggest that aluminum is the nucleus of the molecular magnetic nexus. Moreover, both manganese and copper have slight magnetic tendencies. But these have remarkably balanced loci, manganese being just below the iron groups, and copper being just above, and both in the same 'long' series with iron. Certainly these relations are no accident.

Now if a molecule which contains one element in two states of oxidation shows magnetism in one case, why should it not do so in all? For example, why should not ammonium nitrate $N^{V}\,H_4.N^{V}\,O_3$, be magnetic? It contains nitrogen in the state of extreme reduction in the basic part, and in that of extreme oxidation in the acid part. Yet, as far as known, it is not magnetic. It may be evasion, it may be partial explanation, to say that nitrogen is not strongly nor inherently magnetic. Certainly it does not exhibit the exquisite balance between basic and acid property that iron and aluminum do; nor has nitrogen a locus of an atomic gravity maximum. But neither has oxygen; yet liquid oxygen—a bluish liquid which does not conduct electricity—has magnetic properties. Clearly we may not generalize as yet; but fortunate are we who live in an age of discovery, for discovery is always young. The field of magnetism is open, not to tantalization, but to the sure promise of greater knowledge and greater use.

PROFITS IN THE GERMAN CHEMICAL INDUSTRY.—In the fiscal year 1903-4 comparatively few companies have shown increased profits, and, in fact, the more important among them have, by reason of keen competition, realized smaller earnings. Still shareholders' dividends have been from 5 to 10 per cent for the 12 months. The net profits of the Honningen Chemical Company in 1903-4 amounted to $110,855, permitting the payment of a 10 per cent dividend. The Stassfurt Company, with a share capital of $750,000, showed net profits of $77,195, and a dividend of 8 per cent, while the United Company, of Leopoldshall, from net profits of $78,010 declared 5 per cent on its preferred stock, and 2 per cent on the common. Although it gained $1,620 in net profits to $53,525, the Byk Chemical Works, of Berlin, paid a dividend of 6 per cent, against 7 per cent a year ago. The Wilhelmsburg Chemical Company, of Hamburg, cut its dividend rate from 8 to 6 per cent; the Paul Gulden Color & Tar Products Company, of Leipzig, from 6.5 to 5.5 per cent, while the North German Chemical Company, of Harburg, paid only 6 per cent on the preferred, nothing on the common, and the Union Company, of Stettin, increased its rate from 8 to 9 per cent. A gratifying feature is the improved financial position of the Dusseldorf Color Works, which reports net profits of $7,000, as against a heavy loss in 1902-3. A forecast for the year 1904-5 suggests that the increased activity and better prices ruling will result in a substantial improvement.

CLEAVAGE.*

By GEORGE F. BECKER.

A very large part of the rocks exposed at the earth's surface exhibit schistosity or cleavability not ascribable to sedimentation, and often well marked in masses of igneous origin. In many cases the surfaces along which rocks cleave, intersect one another, producing a foliated structure. In other instances the cleavage occurs in nearly parallel planes or along surfaces having large radii of curvature. None of these phenomena are confined to highly indurated rocks, as might be inferred from some discussions, but are found well developed in soft and fragile unmetamorphosed shales, as all who have made observations in disturbed Tertiary areas are aware. Specimens of these shales are so fragile, however, that they are scantily represented in collections. Slaty cleavage, as the term is used in this paper, means simply the most regular and extreme form of cleavability, or schistosity, in which the laminæ are thin and are bounded by substantially parallel surfaces, no matter whether the material exhibiting these properties is indurated, as in the valuable roofing slates, or is soft and fragile, as in the comparatively worthless shales. Though argillaceous rocks exhibit the most perfect cleavage, this does not apparently differ in kind from the schistosity sometimes found in grit beds, limestone, granite, quartzite and basic eruptives. A structure which is at least analogous is found in rolled or drawn metals, in terracotta articles, such as roofing tiles, and in pastry. In short, slaty cleavage is a structure, or a group of structures not readily distinguishable from one another, and has a character of its own, independent of the material which may exhibit it, although some substances are better fitted than others to display it in perfection. This relationship is recognized in the French term *schiste*, which, in Gallic usage, comprehends shales, slates, and the crystalline schists of English writers. In English usage schist is commonly synonymous with crystalline schist, but the frequent use of this adjective would seem to imply the existence of schists which are not crystalline, and these could hardly be defined otherwise than as equivalent to shales.

Slaty cleavage, even in highly indurated rock, passes over by insensible gradations into less simple forms of schistosity, and vast masses of the crystalline schists show cleavage planes in systems intersecting one another at acute angles. It has always seemed to me that a true explanation of cleavage must include the theory of foliated schists as well as of roofing slate. The association of mica with cleavable rocks has often been insisted upon, perhaps with too great emphasis. Some shales contain much mica, but others contain only a little. According to Professor Rosenbusch, shales (Schieferthone) have the same mineralogical composition as clays, and mica is not an essential constituent. Sorby mentions clay slates which carry very little mica, and G. W. Hawes describes a roofing slate from Littleton, N. H., which on microscopic examination is found to consist of fragments of quartz and feldspar as fine as dust, although in the larger part of the rocks called clay slate in New Hampshire he found abundant mica. Now clay slates and some shales have as good cleavage as mica-schists. Again, quartz-schists and other cleavable rocks contain very little mica. The grit beds or sandy strata found in slates do not always contain much mica, and yet their cleavage is manifestly of the same origin as that of the slate in which they are embedded. It is well known that near intrusive masses mica-schist not infrequently passes over into ordinary schists, and these into phyllites and clay slates, as if the amount of mica were characteristic of the degree of metamorphism rather than an index of the cleavability. "Compression," says Sir Archibald Geikie, "may give rise to slaty cleavage. But it has often been accompanied or followed by further internal transformations in the rocks. Chemical reactions have been set up and new minerals have been formed." In the study of slates it is often manifest that a portion of the mica is secondary. Thus on blind joints (Ausweichungsclivage of Heim) large continuous sheets of mica are frequently found. Muscovite is also well known to be one of the chief decomposition products of the feldspars, an alteration which is readily intelligible from a chemical standpoint. The increase of the mica content of phyllites as compared with shales seems to me most reasonably accounted for as a concomitant of the genesis of cleavage, though not an essential one.

Schistosity as a structure is important, and it is a part of the business of geologists to explain its origin. Slaty cleavage has further and greater importance as a possible tectonic feature. Scarcely a great mountain range exists, or has existed, along the course of which belts of slaty rock are not found, the dip of the cleavage usually approaching verticality. Are these slate belts equivalent to minutely distributed step faults of great total throw, or do they indicate compression perpendicular to the cleavage without attendant relative dislocation? Evidently the answer to this question is of first importance in the interpretation of orogenic phenomena.

The earliest theory of slaty cleavage assimilated it to mineral cleavage, a view not tenable after microscopic study. Mr. John Phillips in 1843 was the first to interpret slaty cleavage as an effect of mechanical strain. Mr. Daniel Sharpe in 1849 offered the explanation now most generally accepted by geologists, viz., that a fracture perpendicular to the line of pressure would run along the flattest faces of the component grains and meet the smallest number of them—a theory implying that the mass is heterogeneous and that the adhesion between the component particles is smaller than the cohesion within the particles. Dr. H. C. Sorby later described a variety of cleavage due to the presence of numerous microscopic blind joints. Professor Tyndall in 1856 made exceedingly interesting experiments on this subject, obtaining admirable cleavage in wax. He denied that heterogeneity aided cleavage. In his first paper he asserted most emphatically that the cleavage was perpendicular to the direction of pressure, but in a footnote and in a later paper he indicated decided doubt as to this perpendicularity. Professor Daubrée (1879) also dissented from the view that heterogencity is essential to slaty cleavage, and ascribed this structure to gliding (*glissement*, slide) in the mass, which is equivalent to a denial of the perpendicularity of the causative force to the consequent cleavage. In 1893 I published a theory founded on experiment and analysis. It is in agreement with Daubrée's idea, but more precise. According to this theory, cleavage is due to a weakening of cohesion along planes of maximum tangential strain (or maximum slide). It is susceptible of proof that deformation due to pressure is actually effected by relative motion of the mass in opposite directions parallel to these planes. When this movement exceeds the elastic limit and falls short of the breaking strain, it would seem inevitable that the cohesion should be diminished and that cleavage should result. Only in ideally brittle substances is there no interval between the elastic limit and the breaking strain. It is, of course, certain that the material constituting slate has been strained far beyond its elastic limit, and that it has a breaking strain is often manifested by blind joints. These planes stand at an angle of 45° or more to the direction of greatest local linear compression. There are at least two sets of them, and maybe four, symmetrically disposed with reference to this direction. In cases of double cleavage—so usual in disturbed areas, both in distinct development and in the more or less irregular form of ordinary schistosity and foliation—cleavage is produced on both sets of planes, so that a cross section shows acute-angled rhombs. In the case of forces acting on a supported mass at an acute angle to the plane of support, it was shown in my paper that the effect of viscosity would be to suppress all but one set of cleavages and to accentuate this remaining one. Tyndall's experiment, properly considered, was shown to be a case of this kind, and it was maintained that the cleavage of roofing slate is thus to be explained. If this be true, a belt of slate is equivalent to a great fault distributed over an infinite number of infinitesimal steps.

*Abstract from 'Experiments on Schistosity and Slaty Cleavage.' *Bulletin* No. 241, United States Geological Survey.

IRON AND STEEL IN RUSSIA.

Official figures recently published show that the production of pig iron in Russia in 1903 was 2,453,953 tons, a decrease of 106,191 tons from the previous year. The output by districts was as follows: North Russia, 22,462 tons; Moscow, 95,594; South Russia, 1,366,437; Poland, 308,914; Ural, 660,546 tons. In Poland there was an increase of 26,612 tons over 1902; all the other districts showed decreases, the most important being in the Ural, where it was 69,797 tons.

The production of iron castings, or foundry work, was 209,000 tons, an increase of 19,000 tons. The wrought, or puddled, iron reported, in finished forms, was 194,000 tons, a decrease of 83,000 tons.

In steel production, however, there was an increase of 315,000 tons, or 15 per cent. The output of steel ingots and of finished steel is reported as follows:

	Ingots	Rolled products.	Castings.
Bessemer.	568,352	454,990	2,558
Open-hearth	1,764,109	1,499,952	31,901
Crucible.	1,705	1,943	. . . . .
Totals.	2,334,166	1,956,885	34,459

The proportion of steel made by the various methods was: Bessemer, or converter, 24.3; open-hearth, 75.6; crucible, 0.1 per cent.

The approximate consumption of iron is given as follows, finished material and machinery being reduced to terms of equivalent pig iron:

	1902.	1903.	Changes.
Pig iron produced.	2,560,000	2,454,000	D. 106,000
Imported as pig	18,000	13,000	D. 5,000
Imported in finished forms	327,000	336,000	I. 9,000
Total consumption. . .	2,905,000	2,803,000	D. 102,000

The consumption of iron per head in Russia is much less than that of any other European country. Exports are not given in the table, as there is practically no iron nor steel exported from the country.

COPPER MINES OF LAKE SUPERIOR.—VIII.

By T. A. RICKARD.

The Atlantic mine has achieved an enviable reputation by reason of holding the record in the profitable exploitation of low-grade copper ore, the average of the output during the last three years having been successively 11.4, 11.695 and 12.76 lb. of refined copper per ton, this being equivalent to 0.57, 0.555 and 0.638 per cent, respectively. It will be interesting to note the conditions and methods which have enabled Mr. Frank McM. Stanton, the manager, and Capt. John Stratton, the mine captain, to attain these remarkable results.

All mining is done by contract. Each contract is usually let to four miners for a block of ground, 90 to 95 ft. long, and reaching nearly up to the next level. The actual height of the stopes will depend upon the nature of the ground—that is, whether or not, for instance, the hanging is heavy, it being customary to leave a floor or arch 12 to 15 ft. thick to support the level overhead, so that the stopes are 70 to 73 ft. in height, as measured from the track of the lower level, each 'lift' being 85 ft. on the lode.

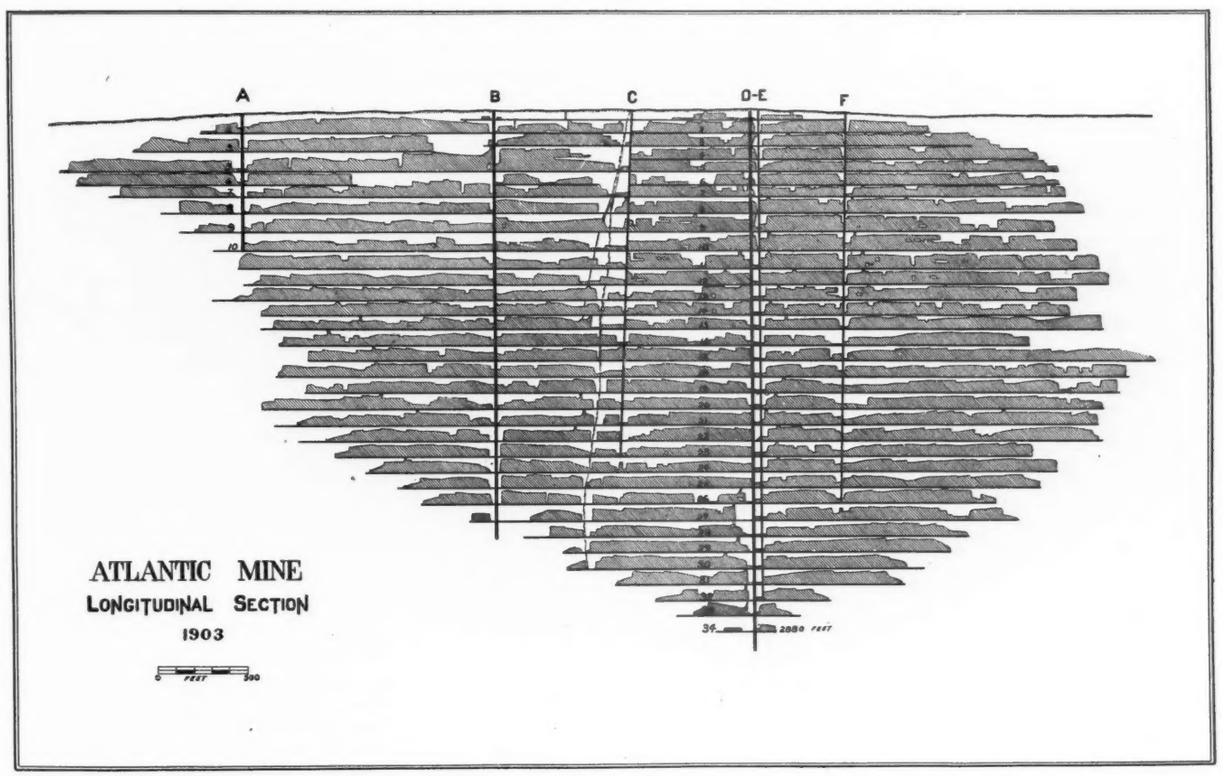
The full size of the lode is broken, "from trap to trap," or from foot to hanging-wall; the width ranging from 13 to 17 ft., with a steady average of 15 ft. The miners are paid for 15 ft. and must take the full width, whether less or more, as directed by the shift-bosses. It used to be the practice to pay by the cubic fathom, but owing to the temptation to get an extra width by blasting into poor rock wherever the lode was narrow, it was found more satisfactory to assume 15 as the unit of width, and to multiply this into the height and length when measuring up, before settling with the contractors; but this rule is interpreted fairly by the mine captain, so that no injustice is done to the men in those instances where a greater width than 15 ft. of copper rock is actually broken.

Main drifts are run 8 ft. high, and, usually, the width of the lode. As the driving forms, almost invariably, a part of the whole contract, the width of the drift is left to the judgment of the men, who either break the full size of the ore as they progress, or make a drift 8 ft. wide and 6 ft. high. When the specified distance—90 to 95 ft.—has been advanced, the men come back and extend the 'cutting-out stope' (or, as they express it, "put in the timber ground") to a height of from 16 to 18 ft. above the track. Stulls are put in place and lagging is laid over them. Then regular stoping commences, and is continued until the contract has been carried out and the ground squared, measured and paid for. Thereupon another stretch of drift is started and the succession of operations is repeated, as before.

It takes about two months to advance a drift 90 feet—remember that it is carried the full width of the lode—and it requires about three months more to finish the cutting-out stope. Timbering is done by company men as the stopes advance. Stulls over the level are four feet apart, and the lagging is so placed that it can be pulled out between any two timbers whenever it becomes necessary to make a pass for the rock broken overhead. This runs down to a platform or 'sollar,' made of three or four boards laid level with the track, and from this platform the rock is shoveled into the cars. There are no chutes or timbered mill-holes. It is appreciated that the use of them means great wear and tear of timber, so the broken rock is allowed to run down along the foot-wall of the stope, which dips at about 54°, the stulls being arranged in line so as to break the descent as little as possible. The rock broken in the drift is trammed out, but that which comes from the cutting-out stope is left for the miners to stand upon while making the next cut; then this material also is removed pending timbering. When this work is done, and stoping is resumed, the broken lodestuff is allowed to accumulate so as to rest upon the stulls until the top of the stope—say, 70 ft. above the track—has been attained; then the lodestuff is drawn away through holes made by removing the lagging between the stulls at the level.

The lode dips at 54°, and therefore allows a free descent of the rock by gravity; but it is too wide to permit rigging up of the drill on the foot-wall. Scarcely any sorting is done, but as the rock is loaded into the cars underground an occasional piece of clean trap is picked out; this only amounts to one car in 40 or 50, that is, 2 to 2.5 per cent. At surface some sorting is done in the rock-house, but this also is insignificant in proportion, only one car per shift—that is, one in 200 or 220, equivalent to less than 0.5 per cent. This, of course, is an important factor in keeping costs low. In the rock-house one man handles from 90 to 95 tons per shift; there is but little time lost in picking out pieces of lump copper as compared to richer mines, for only about 5 barrels, containing 3 tons in all of metallic copper, are picked out of the total output in the course of an entire month, during which period 36,900 tons of copper rock are hoisted.

Contractors pay for candles, fuse, caps, powder and steel, as consumed. The usual price for stoping is $7.50 to $8.50 per fathom cube, with a fixed width of 15 ft. Drifts—6 ft. high and 8 ft. wide—are worth $6.50 to $8.50 per running foot, but this method of measurement is only adopted when no stoping is included in the contract. In drifts the drill-holes average from 5 to 6 ft. deep, and in stopes 7 to 8 ft. When stoping, 5 holes per shift of 10 hours is considered fair work, this representing the breaking of about 75 to 80 cubic fathoms per month. In drifts, 6 to 7 holes per



shift is pretty good; this, at the rate of 40 to 45 ft. per month, the full width of the lode, is equivalent to 16 to 20 cubic fathoms. Twelve cubic feet of rock in place represents a ton.

Timbers vary from 16 to 30 in. diam., averaging about two feet. Two men make the round of the workings to drill 'block holes,' so as to break up masses of rock too big for handling. The latter is also facilitated by the design of the cars, an important factor in the attainment of low costs. As the accompanying drawing will illustrate, the cars are 8 ft. long, 2 ft. high, and 28 in. wide, inside. They require two men, and carry 1.7 tons. The bottom of the car stands only 8 in. above the track, so that shoveling is easy; both ends are open, and the wheel-base is so proportioned

The output of the mine ranges from 1,300 to 1,400 tons of stamp rock per 24 hours, while sinking of one shaft is going on. This production is due to the labors of 338 men underground aided by 37 machine drills. The distribution includes:

148 men on the drills, 2 men per drill per shift.

156 trammers, timbermen and helpers.

5 shift-bosses and 2 trammer-bosses.

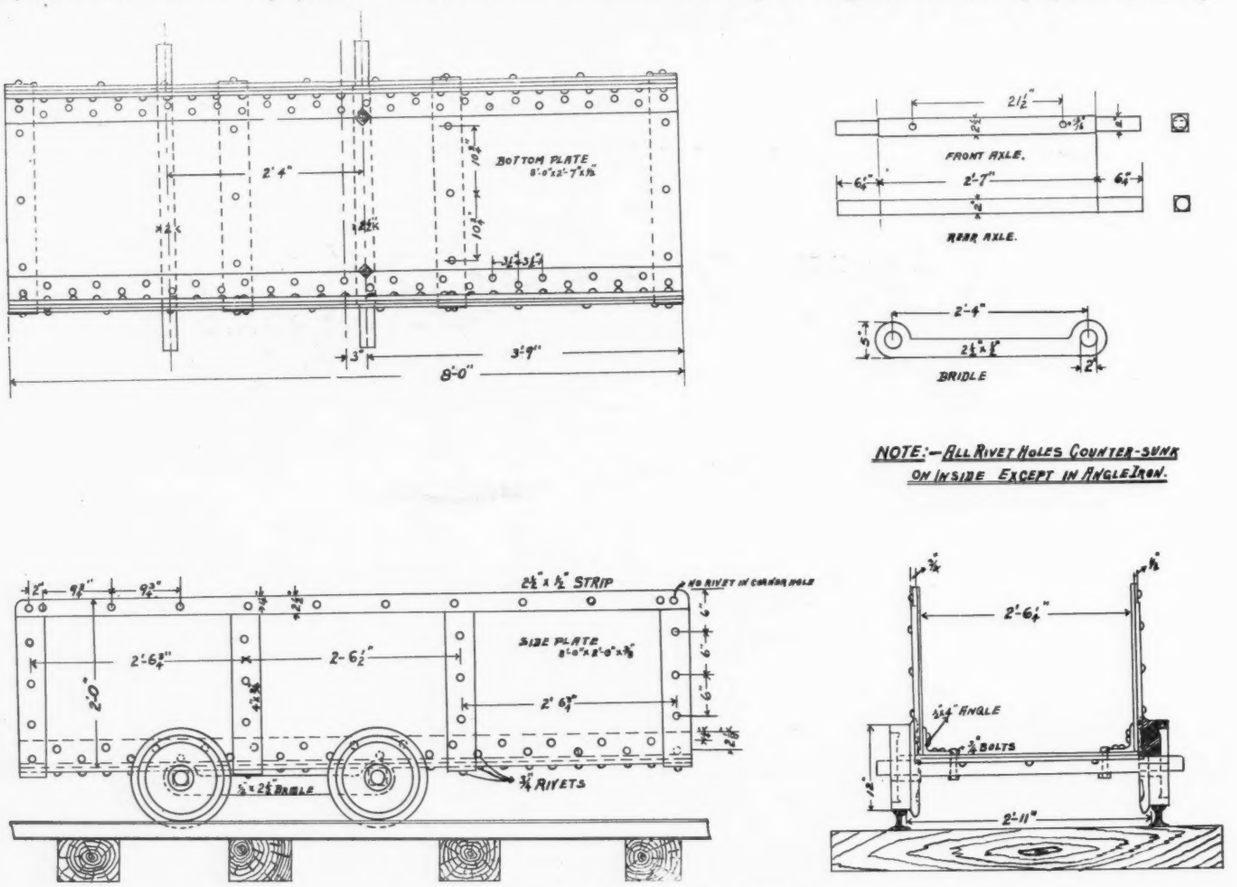
2 men drilling block holes and 2 repairing skipway, etc.

6 timbermen and 6 helpers.

The care of the shaft, skipway, pumps and actual sinking of one shaft is included. Two boys sprinkle the shaft-timbers and the drift-timbers with water for a distance of 50 ft. each way from the shafts, in order to prevent dry rot, the fungoid growth which destroys the timber wherever there is either not enough water to keep it wet or the air is too dry. Formerly the timbers between the 9th and 12th levels used to decay in a year or 18 months; now, by reason of the sprinkling, they last for five or six years.

The low working cost at the Atlantic is due to the comparative uniformity of the lode, bringing sorting down to a minimum; it is also due to the continuity and length of the orebody. This is indicated, better than in words, by the accompanying longitudinal section of the mine. Mine managers in other regions will appreciate the eloquent testimony afforded by this stope-map of the Atlantic. Furthermore, the copper rock is a comparatively soft amygdaloid, easy to drill in the mine and easy to stamp in the mill. The width—15 ft.—is conducive to expeditious stoping, and the dip—54°—facilitates transfer from the stope to the car. Beyond these favorable factors, and equal in importance to any of them, is one which is to be credited not to nature but to man, and that is sound business management, counting the cents no less than the dollars, and directing operations with an excellence of judgment worthy of the best traditions of the mining industry.

The Wolverine mine is one of the most successful enterprises in the Lake copper district, and for this reason the methods employed underground invite investigation. In general, the system in vogue resembles that which we have seen at the Atlantic, with modifications due to greater richness of lode, a greater width of stoping and a flatter dip.



TRAM-CAR USED IN THE ATLANTIC MINE.

to the overhang that the car can be tipped easily at either end, and the sloping surface of the bottom can readily be utilized as a skid for sliding heavy rocks into the body of the car. The trammers pile up big pieces at each end so as to make a rough sort of retaining wall, and then shovel the small stuff inside. It used to be the practice to fill a closed car from a platform or sollar 28 in. above the track, as is done in the majority of metal mines, but since most of the rock "breaks big," the trammers cannot control them without great loss of time and the smashing of the cars by the ill-regulated descent of large chunks. Two car-loads fill a skip; the latter rests on the track while being charged, but it is kept in place by a gate, a heavy wooden framework hinged to a cross-timber along the hanging-wall of the shaft, and lowered into place under the skip by means of a ⅝-in. wire rope, running over a block operated by a lever at the station.

When opening a new level a stope-drift is let on contract, a breast 25 ft. high being carried forward at the full width of the lode, about 12 ft. If stoping is not included in the contract the drift is made 6 ft. high and 6 ft. wide, the price averaging $5.50 per running foot. Stoping is paid for at an average price of $8.50 per cubic fathom of 216 cu. ft.; in the case of a stope-drift the miners receive $5.50 for the size of a drift, the remainder of the excavation being paid for on a stoping basis.

The lode is remarkably regular in width, and, as a matter of fact, there are no stopes less than 12 ft., except in one place on the West vein; on the other hand, the maximum rarely reaches 20 ft. It has been found, by actual computation from the area of ground excavated and the tonnage received at the mill, that the average width of rock extracted throughout the mine is 12 ft. I explain this matter carefully because it is an important fac-

tor in the contract system, in the application of which there is an assumed unit of width—which is this 12 ft. The men are paid by the cubic fathom, but in every case the unit of width is the same, even though the stopes should exhibit local divergence from this average. An example will make this clear: If the ground broken by four men measures 20 ft. long by 19 ft. high, then the width is put down as 12 ft., making 4,560 cu. ft., which, divided by 216, is equivalent to 21.1 cubic fathoms, or, at $8 per fathom, $168.80. In every contract the width is put down as 12. This practically amounts to payment by square fathom for the full size of a uniform width of lode, and on this basis the price would be twice as much per square fathom as it is now per cubic fathom, the width being 12 ft. in both cases. In the above example 20 multiplied by 19 would equal 380 sq. ft., which, divided by 36, would give 10.55 square fathoms; and this at $16 per fathom would make the same total, namely, $168.80. This curious practice is described in detail because it puzzled me a good deal, and it affords an example of empiricism without theory, or, to put it kindlier, of method developed from experience, and adapted to particular conditions.

In order to meet extreme variations from the assumed uniformity, a fair treatment of the miners is required, and they receive it at the hands of experienced 'captains.' This is as true at the Wolverine as at the Atlantic. If the lode is unusually wide, say 18 or 20 ft., and the men have fallen short of earning an average wage, the captain "turns in a fathom or two" so as to make it right.

To return to the actual mining: When the drift has been extended to the boundary or to the end of the orebody, a 'stope and raise' is started to reach the level overhead so as to establish ventilation, and make a point of departure from which the stopes are extended backward toward the nearest shaft. The 'stope and raise' is let for a length of 75 ft., and when it is finished regular stoping or 'clift and stope' is given out in blocks of 60 to 80 ft. long, this being about the amount of ground covered by a party of four men working for a period of three months. 'Stope and raise' is worth $7 to $8 per fm.; once in a while the men are allowed as much as $9 per fm. in unusually hard ground, but no contract has ever been let at that figure, the extra amount being a concession made simply as a matter of fair dealing. Plain stoping averages $7 per fm. Contracts are given to four men with one drill, two men per shift. If only two men are in the contract the price is $6.50, because they work on day shift only. The men are paid individually, the subdivision of the total amount earned being done by the company. This prevents sub-contracting. Part payment is made every month, but the final settlement is not effected until the contract is finished and the ground squared. The men then get the balance due to them. Sinking of shafts is also done on contract, at an average of $16 per ft., for a shaft 8 ft. by 17 ft. in the clear. All supplies and steel are paid by the contractors. A deduction of $4 per month is made for steel consumed; the drills are weighed at intervals of three months. If two men only are joined in a contract they pay $2 per month for their steel. This is for wastage. If any drills are lost the men pay at the rate of 25 cents per pound.

There is no timbering whatever to be seen either in stopes or drifts. The lode dips at an angle of 40° and the ground stands splendidly. Even the shafts are not lined, the only timbers being the dividing posts between the skipway and the ladders. The rock does not 'blister' or scale off. A staging of plank on light spreaders is the only wood to be seen in the stopes. When the width removed is unusually great a stull or two is employed to hold up the broken rock so that the men can rig up their drill in order to reach the hanging; but this is uncommon. Usually the dip and width of the lode jointly afford conditions permitting the drill to be set up on the foot-wall. This matter of dip is important in several ways; while by being rather flat it facilitates the preparations for drilling, it is, on the other hand, not too flat to prevent the descent of the broken rock. The latter runs fairly well, despite the uneven surface of the foot-wall. Big pieces of rock roll automatically, and it is only the fine stuff that has to be scraped down, which is done whenever a stope is cleaned up on its exhaustion. There are no timbered chutes or 'mill' holes; as Capt. William Pollard said to me: "The men just put down a board or two, and make a sollar at the level." From this extemporized platform the trammers shovel the rock into the cars. The latter resemble those at the Atlantic; they are 7 ft. long, 2 ft. 6 in. wide, and 2 ft. 2 in. high, with 12-in. wheels and a 22-in. wheelbase, so that they swing around easily. The track is of 3-ft. gauge and the bottom of the car is only 8 in. above it.

The back of the car is closed, but the front is open; the latter has an overhang of 3 ft. 4 in., and when big rocks are handled the front of the car is depressed, so that the bottom of it can be used as a skid. The larger pieces are placed at the front end, making a rough wall, while the smaller stuff is thrown behind. The overhang is less in front than behind, but this is adjusted by the lesser weight at the back of the car. There are three men to each car; one man picks out occasional pieces of waste while the other two are loading. As soon as two car-loads of waste have been accumulated—making one skip-load—they are sent to the surface. The waste from crosscuts and other barren exploratory work is dumped into old workings and is not hoisted.

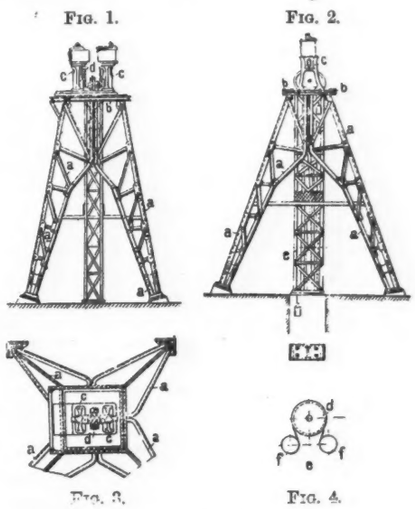
The lode is a comparatively soft amygdaloid, and does not contain much lump copper; what there is of it is picked out at the rock-house, in amounts varying from 10 to 20 tons per month. At the mill another 10 or 15 tons is sorted out before the rock goes under the stamp. Last year a total of 328,000 tons of rock was hoisted and only 14,000 tons of waste was picked out, this being equivalent to about 4 per cent only of the full width of lode stoped in the mine. The output for the year ending June 30, 1904, averaged 29.61 lb. refined copper per ton of ore, equivalent to 1.48 per cent. The costs, including construction, amounted to $635,185.18, equal to 6.869c. per lb. refined copper; the profit was $557,240.34; consequently the profit was in the proportion of 87.72 per cent. Those who are familiar with copper mining will appreciate the unusually favorable character of the conditions prevailing in the Wolverine mine; if the lode had a dip of 1° more it would be as perfect a proposition as a miner could desire; if the dip was 5° more, stulls would be required for the miners to stand upon, and if 5° less it would be too flat for the free descent of the broken ore. So it is evident that the conditions are nearly ideal.

A NEW FORM OF HEAD-GEAR.

The accompanying sketch shows an arrangement of head-gear for a coal mine, which has been designed by Anton Raky, of Erkelenz, Bohemia, who advocates his plan in the *Oesterreichische Zeitschrift fur Berg- und Huttenwesen.* He there claims that his design will do away with the lateral strains to which the head-gear is subjected in the usual method of construction.

In the sketch, Fig. 1 is a front elevation, Fig. 2 a side-view, Fig. 3 a plan, and Fig. 4 an arrangement of guide-rollers. The special points of this design will be readily seen from the sketch. Briefly, Herr Raky proposes to mount the hoisting engine directly on top of the head-frame, using a vertical engine which will act directly on the hoisting wheel. Either double cages or a counterbalance must be used.

In the sketch the engine *c* is mounted on a platform *b* of the head-frame *a*. The rope-pulley *d* is fitted with brakes, stops, etc., and has slung round it the rope *e*, both ends of



which hang down the shaft so as to support two cages if necessary, the one then counterpoising the other. A pulley of any size can be used; only if its diameter does not coincide with the distance between centers of the two winding compartments, the rope will have to be guided into the proper position by the rollers *f f* shown in Fig. 4.

Either steam or compressed air may be used as motive power for the engine; or an electric motor may be substituted for the engine.

The objections to this design seem to be chiefly in the increased strength required in the head-frame to carry the weight of the engine, and to resist the vibrations caused by its operation.

ACTIVE AND INACTIVE CHLORIDES.—All soluble ionized chlorides, such as sodium chlorides, are precipitated by silver chloride. The chlorine in chloroform, though chloride chlorine, is not so precipitated, because the compound is not ionized and dissociated, but is associated.

In Abyssinia gold-dust as mined is placed in quills, and after its first change of hands is worked into rings of pure metal for market. Mining is a pastime for the inhabitants, who do this work after tending their flocks and fields. The sales of gold amount to about $440,000 annually.

GEOLOGY OF THE BROKEN HILL LODE.

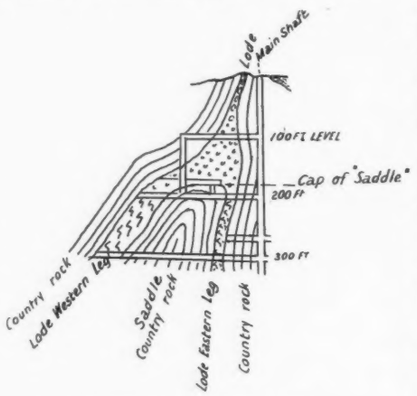
By F. S. MANCE.

The great activity at the Broken Hill mines in New South Wales, and the extensive output of ore which is being maintained, have been the means of reviving interest in the geology of this lode.

Mr. E. F. Pittman, the government geologist, was the first to definitely give expression to the opinion that the lode is a saddle. This view was supported by Mr. J. B. Jaquet, in his monograph, and it has been generally accepted. The economic importance of the correctness of this theory lies in the fact that it warrants the expectation of a repetition of the great orebody at deeper levels.

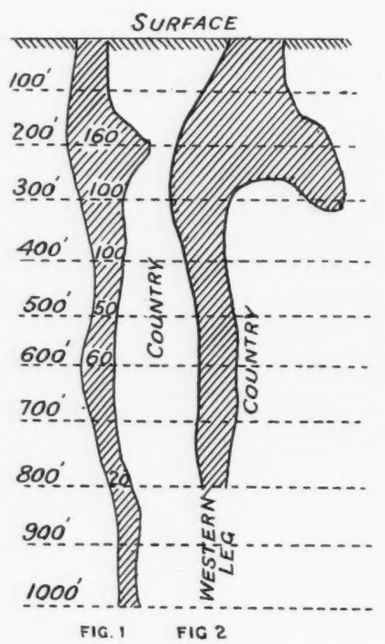
There are many, however, who are not in agreement with this view. Mr. Donald Clark[1] considers that the Broken Hill lode is not a true saddle, but a lode, the filling of which came from below and occupied cavities which were opened at the time of its formation; the saddle, so well described by Mr. Jaquet, being simply due to the fact that the cavity between the upper strata of the anticline was filled laterally from a nearly vertical vein.

A valuable contribution on the subject has recently been supplied by Professor Gregory. In an article appearing in the Melbourne *Argus*, he states that he found it necessary first to get a clear definition of a 'saddle reef.' He accordingly requested two leading authorities, who take opposite sides in this controversy, to define a 'saddle reef.' Mr. E. J. Dunn, the author of a monograph on the Bendigo gold field, gave his definition of such a reef as "a lenticular quartz lode lying between bedding planes of rock, bent over in anticlinal or synclinal folds." Mr. E. J. Horwood, manager of the Proprietary Company's works at Broken Hill, and one of the leading supporters of the saddle theory, defined a saddle reef as "one which occurs in a cavity between two beds of sedimentary rock, generally at the anticline (but also occasionally at the syncline), formed when these beds are subjected to great pressure in the direction of the bedding planes, which, before the formation of the anticline (or syncline) would be in a position approximately horizontal." Professor Gregory states that the definitions agree in the following four essential facts: (1) That saddle reefs occur in sedimentary rocks; (2) that they are formed along the bedding planes; (3) that they have been formed in cavities; (4) that the cavities are due to the folding of the rock. In considering how far the Broken Hill lode possesses these features, Professor Gregory ventured the statement that the rocks in which this lode occurs are not, and never were, sedimentary rocks, and that the schists and gneisses inclosing the Broken Hill lode are a series of altered igneous rocks. From the definition just quoted it is argued that it would be an extension of the present term 'saddle reef' to apply it to reefs in altered igneous rocks. A more serious difference is that saddle-reefs are formed by the infilling of cavities, while the evidence, Professor Gregory says, seems convincing that the Broken Hill lode belongs to the replacement class and has been formed by the mineralization of a belt. As the rocks have been contorted and faulted, the natural supposition is that the spurs from the main mineralized belt, or lode, should, in places, follow round these contortions, and that the lode would become thicker where the adjacent rocks have been so crushed or shattered that they could be easily permeated by the ore-bearing solutions. He states that a portion of the main lode appears to have been determined by a series of powerful faults. Mineralization of the rocks along the faults has formed the main lode, while branch lodes have been formed in other places where there were bands or blocks of permeable rock. Sections across



SADDLE-LODE, BROKEN HILL.
(After J. B. Gregory.)

the lode are said to show that it is in some places a simple vertical lode, in others it has a marked bulge and the section is carrot-shaped (Fig. 1); but where the lode passes across rocks which have been easily penetrated by the ore-bearing solutions, the bulge is much



SECTION OF LODES AT BROKEN HILL.
(After J. B. Gregory.)

larger and may give rise to a purse-shaped branch (Fig. 2), and yet in other places the offshoots from the main lode occur as saddle-shaped spurs. These saddle-shaped spurs are in some cases, as in the Central mine, repeated one below the other. Such branches from the main lode, Professor Gregory states, are 'reefs,' and as a matter of description might be not inappropriately named "saddle-shaped reefs or saddle-reefs." He adds, however, that it does not follow that there is any analogy between these reefs and the true saddle-reefs of the Bendigo mining field, and the application of the prospecting methods of Bendigo to Broken Hill would probably lead to serious waste. The conclusions arrived at by Professor Gregory are that "the Broken Hill lode is a replacement lode, due to the mineralization of a belt of foliated igneous rocks; the main lode is due to the mineralization along a series of faults. From the main lode there is, in places, a series of saddle-shaped reefs which pass off into the adjacent rocks; they are, however, of secondary importance in comparison with the great vertical lode which has made the fortunes of Broken Hill."

The remarks of Professor Gregory have brought forth a joint reply from Messrs. Pittman and Jaquet. They contend that it is not by any means necessary for the formation of a saddle lode that the bounding rocks should be stratified, provided that they be laminated and that the laminæ possess sufficient cohesion to permit of their being folded. In this connection it may be remarked that Professor Gregory admits that the laminated rocks of Broken Hill have been regularly folded. Messrs. Pittman and Jaquet suggest that the term 'saddle' has reference to the shape of the deposit, and can be applied to any body of ore which rides upon an anticline (or syncline in the case of a reversed saddle), just as a saddle rides upon a horse's back. It is stated by them that it cannot be controverted that the great Broken Hill lode is bifurcated and rides for a length of a mile and a half upon an anticline. As the 'center country' or cap of the anticline, which extended along the entire length of lode, has been in many places either removed or buried from view under old workings, Professor Gregory could not have had an opportunity of making an extensive examination of it. In view of the fact that the main orebody so closely follows the top of the anticline, and in no single instance cuts across it, they say they can come to no other conclusion than that this lode owes its presence to this great anticline. Near the southern boundary of the Proprietary mine the anticline pitches downward to the southwest and the ore goes down with it. Messrs. Pittman and Jaquet contend that along the cap of the anticline the laminæ of country would tend to separate from one another and form spaces along which the ore-bearing solutions first gained admittance. They admit that a large amount of replacement has taken place subsequently, and refer to instances where a narrow fissure or fault will give rise to a wide lode through the replacement of the country upon either of the walls.

The question of the rocks in which the Broken Hill lode occurs, these gentlemen say, cannot be disposed of in an offhand manner, or settled by the microscopic examination of a few samples. They state that after devoting months to an examination of the country within a radius of many miles from the mines, they are inclined to the opinion that the great bulk of the rock is of sedimentary origin. The crystalline schists include in places beds of limestone and can be seen passing by insensible gradations into normal slate, limestone and breccia.

With regard to the statement of Professor Gregory "that the position of the main lode appears to have been determined by a series of powerful faults," Messrs. Pittman and Jaquet say that after a thorough examination of the workings they found no evidence of any

[1] 'Australian Mining and Metallurgy,' pp. 346-349.

great faulting. The beautifully arched bedding (or foliation planes) of the 'center country' may be observed in an absolutely undisturbed condition, and this, they say, proves that there has been no longitudinal faulting of any magnitude—that is, in the direction of the axis of the anticlinal fold. In no case can it be shown that the lode leaves the anticline to follow a line of faulting. On the contrary, Messrs. Pittman and Jaquet state that they know of no single instance where it cuts across the planes of bedding or foliation.

They point out that while the western leg of the Broken Hill lode has been found to terminate in some places at a comparatively short depth below the cap of the anticline, the eastern 'leg' has so far been persistent in depth. It has always been recognized, however, that this lode, which in places was over 300 ft. wide, was on a much larger scale than any of the auriferous saddle reefs at Bendigo, and that this is entirely due to the magnitude of the folds of the bounding rocks at Broken Hill as compared with those of Bendigo.

In conclusion, Messrs. Pittman and Jaquet urge that sufficient work has not yet been carried out at Broken Hill to prove that other saddles do not occur beneath the big lode.

GEOLOGY OF BRITISH COALFIELDS.—Dr. Teall, the director of the Geological Survey of the United Kingdom, reports that in South Wales the mapping of the main coalfield is now on the point of completion, while that of the Pembroke coalfield has commenced. In the Midland district progress is being made with the survey of the southern part of the Derbyshire and Nottinghamshire coalfield, a large part of which is concealed beneath Permian and Triassic rocks. From recent investigations it has been ascertained that certain disturbances in the overlying rocks correspond with faults in the coal measures below, supporting the view that a detailed survey of the Permian and Triassic rocks will probably throw important light on the structure of the concealed coalfield, notwithstanding the fact that this structure has, Dr. Teall states, in the main, been determined by earth movements of pre-Permian age.

ROAD BUILDING IN THE FAR NORTH.*

By C. W. Purington.

(*Continued from Page 829.*)

The Yukon Territory of Canada offers the most instructive lesson in practical highway construction in the north, and affords a striking contrast in this respect to the adjacent American domain. The officers of the Department of Public Works of the Yukon Territory, notably Mr. S. A. D. Bertrand, the superintendent, and Mr. W. Thibaudeau, the territorial engineer, courteously placed at my disposal the data, of which the following summary cannot fail to be of interest in this connection.

The longest road in the territory is from Dawson to White Horse, 342 miles. Prior to 1899 all freight was transported (from Dawson) to the mining creeks by pack animals during the summer, and sledded either with dogs or horses over the ice and snow in winter.

Wagon-roads and sled-roads have been constructed, in miles:

	1899.	1900.	1901.	1902.	1903.	Total.
Wagon roads	45	32	63	85.81	26	251.81
Sled roads.....	160	10	80.25	372.00	4	626.25

Amount expended from, and including, 1899 to 1903, in the construction and maintenance of roads and bridges:

1899.	1900.	1901.	1902.	1903.	Total.
$50,000	$205,610	$147,175	$228,543	$398,790	$1,030,118

Average cost of construction for wagon-road, from $1,500 to $3,300 per mile; average cost of construction for sled or winter trail, $250 to $350 per mile.

Repair and maintenance of roads per mile per annum: Cost for wagon-roads, $350 per mile, and costs for sled-roads, $25 per mile.

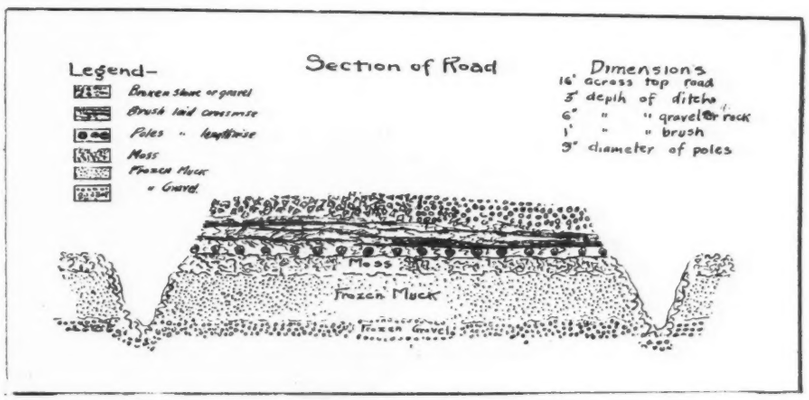


FIG. 5. METHOD OF BUILDING ROAD OVER MOSS-COVERED GRAVEL FLATS.

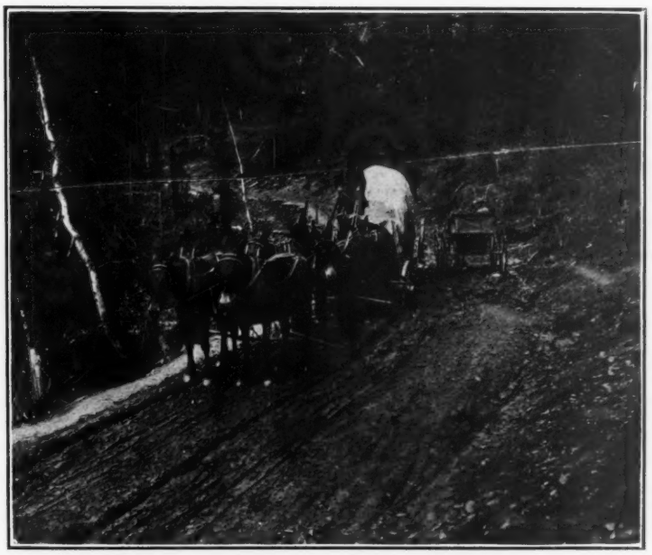


FIG. 6. SIX-MULE TEAM HAULING 8,000 LB., HUNKER CREEK, YUKON TERRITORY.

The following comparative statement gives the price charged per 100 lb. for freight in 1899, previous to the construction of the wagon-roads, as compared to present rates during the summer months. The improved condition means a direct benefit to the miners of at least six hundred per cent on all supplies and machinery freighted by wagons over first-class roads:

From Dawson to		1899.	1903.
Grand Forks	12 miles from Dawson	$7.00	$1.00
Gold Bottom.....	20 " " "	8.00	1.50
Caribou	33 " " "	12.50	2.00
Discovery Sulphur ..	35 " " "	12.50	2.00
Gold Run.	55 " " "	18.00	3.00

The estimate for the amount required for maintenance of roads and bridges in the Yukon for the year ending June 30, 1904, is $103,190. The men employed in road construction are paid $5 and board per day of 10 hours. A team of horses, used in scraping or carting, is reckoned at $25 per day, including wages of the driver. Foremen are paid $6 and board per day of 10 hours.

Several bridges of a permanent character have been built in the Territory, the principal of which is the Ogilvie steel bridge over the Klondike river, the cost of which was $35,000. It is illustrated by Fig. 4.

The method of constructing the roads in the Yukon, where frozen muck and gravel flats are traversed, is illustrated in Fig. 5. This section was drawn from information furnished by Mr. W. Thibaudeau. It has been the experience that this type of road, costing $3,200 per mile, is much less expensive to maintain over frozen ground than roads running along the hill-sides. In the kind of road here illustrated it is found that the leaving of the moss intact under the bed of poles protects the ground from thawing, and the black frozen muck, having the consistency of solid stone,

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remains as a firm bed. The faces of the side ditches are not always banked with sod, but such banking affords additional protection. The ditches are cut either entirely in muck or partly in muck and partly in underlying gravel. These conditions vary with the thickness of the muck. On the other hand, when the moss blanket is cut into, as is necessarily the case in all side-hill cutting, the sun and seepage water gradually thaw the frozen muck, which becomes a soft, slimy mass. The cost of maintenance has been found so much greater that the roads are now led over flat or nearly flat ground in preference to slopes, even at the expense of greater distance between terminal points. Fig. 5 illustrates a typical road, over the Klondike river flats near Dawson, where the moss blanket was not removed before building. This road is in continual use for heavy freighting and the passage of six-horse stages.

Two miles from the town of White Horse, in the Yukon, on the road to the copper deposits, an excellent stretch of corduroy road may be seen extending over a marshy piece of unfrozen ground. The 6-in. timbers used for lagging have all been flatted on the upper side for a width of 15 ft. in the central portion, so that a rough wagon track is formed. Thus a more even wear on the lagging is maintained than when the timbers are left in their original round condition.

Fig. 6, a photograph taken in July, 1904, shows a six-mule team hauling 8,000 lb. with a trailer on an up-grade stretch of road in Hunker creek, near Dawson. A sad comparison is afforded by Fig. 7, a photograph taken in August, 1904, which shows a six-horse team endeavoring to haul a load of 3,300 lb. from Fairbanks, on the Tanana river, to Cleary creek, in the Fairbanks district of Alaska. Not

FIG. 7. SIX-HORSE TEAM, HAULING 3,300 LB., MIRED ON CLEARY CREEK.

a half mile from the point where this picture was taken, on the road to Cleary creek, a cart bearing a 15-h. p. boiler was seen, broken down, its wheels buried in mud and water. A pathetic spectacle this, in a country where summer minutes are golden, and where men's fortunes and very sustenance depend on their having quickly at hand their simple but necessary tools of trade.

The Central Yukon Province.—Mr. A. H. Brooks, in his article entitled 'Placer Mining in Alaska in 1903,'[1] has suggested the following routes for government roads in this province: "(1) A road from Eagle to the Tanana, the Chistochina, and to Valdes, on the coast, a distance of approximately 400 miles. This probably should follow the present well-established trail, which is used as winter and summer mail route. The most important part of the road would be that between Eagle and the camps of the Forty-mile region. An alternate route would be to Fairbanks, on the Tanana, from Copper river by way of the Delta river valley, a distance of about 300 miles. (2) A road to extend from Circle, on the Yukon, through the Birch creek and Fairbanks district to the Tanana, a distance of about 150 miles. (3) Rampart, on the Yukon, to be connected with the mouth of Baker Creek, on the Tanana, by a road which would open up the Minook and Baker districts, a distance of less than 50 miles. (4) A hundred miles or so of road to be built in the Koyukuk region to connect the gold-bearing creeks with the head of steamboat navigation on Koyukuk river. It is believed that these roads would form a system of main arteries by which most of the placer fields could easily be reached, and that the production of the mines would thereby be so much increased as to fully justify the expense."

FIG. 8. FAIRBANKS CREEK, CENTRAL YUKON PROVINCE.

Well constructed roads following the above routes would result in the cheapening of freight charges to a rate one-fourth of those at present prevailing in the several placer districts which they would traverse. The operations in the Birch Creek and new Fairbanks placer districts, for example, are directly dependent on prices of supplies laid down on the claims. The width of the pay-streaks in the broad creek valleys frequently increases considerably as freight rates become lower. Such a statement would appear absurd applied to regions where the charge for freighting represents only a small percentage of the original cost of the commodities. Where, however, the cost of materials, especially machinery, is rendered double or more by freight charges, transportation facilities become a highly important factor in considering whether a given piece of ground is or is not workable. Prices for mining supplies in the town of Fairbanks, the supply point for the new gold placer region on tributaries of the Tanana river, are by no means cheap. They are, however, as compared with prices on the claims which lie at from 15 to 25 miles inland, strikingly low. For example, a hundred feet of 8-in., 16 gauge, hydraulic riveted steel pipe weighing 6.3 lb. per ft., costs in Fairbanks town $175. On Fairbanks creek, 20 miles away, this same 100 ft. of pipe, with freight at 20c. per lb., costs, if transported in the summer, $301, representing a freight charge of $126. In the Klondike, where the topography is very similar, the same pipe would be landed on a claim 20 miles from Dawson for a freight charge of $9.45.

Anything worse than the present condition of the trails in the Alaska interior it is difficult to conceive. Men ignorant of the use of a map and compass are frequently lost in the vast maze of rolling mountains, and undergo hardship and starvation. It is a curious fact, dependent on the peculiar frozen conditions, that the great river-flats, where the present trails are at their worst, are the very places where wagon-roads of the Dawson type can be most easily maintained. As for the hill country, the roads can in many cases be led almost continuously for distances of from five to twenty miles along the crests of gently rolling divides.

Seward Peninsula Province.—In the central and western portions of the Seward peninsula, namely, the Nome, Solomon, Council, Topkok, Kugrok, Teller and York districts, any projects of installation of roads must take into account the entire absence of native timber. The region so defined is the one which has attained importance as a gold-producing area, while the eastern portion of the province, where scant growth of spruce does occur, is not at present productive.

Owing to these conditions, wagon-road construction which employs the use of timber in any form will be expensive, and as seen by the table given previously in this article, the cost of building the narrow-gauge railways which have done excellent service in the Seward peninsula, is $6,000 per mile, exclusive of rolling stock, and in some cases even less, while the cost of wagon-road of the Dawson type will rarely fall below $4,000 per mile. The rates for haulage on these railways may be reckoned at $1 per ton per mile. In summer wagons with broad tires now haul freight over roads which have, as it were, made themselves, at rates which vary according to the nature of the country traversed, from $1.50 to $3 per ton per mile.

It is questionable if wagon-roads, expensively built and aiming at any degree of permanency, will ever be constructed in the Seward penin-

[1] United States Geological Survey, 'Bulletin 225,' Washington, 1904, p. 57.

sula, to supply the needs of the gold-mining communities. The Nome-Arctic railway, from Nome to Anvil Creek, 12 miles long, for which the ties are laid, for a portion of its length, on a 2-in. plank bed, appears to serve a useful purpose. Only 70 days were consumed in the construction of the 12 miles. The Wild Goose railway, also of 3-ft. gauge, from Council to Ophir Creek, has been constructed in a similar manner. Eight miles of standard gauge railway, the Council City & Solomon River railway, have also been completed. Considering the comparative cheapness with which railroad material can be landed at various points on the Seward peninsula, it is likely that short lines of railroad will continue to be built by private enterprise to supply the several inland mining communities.

The suggestion is here made that narrow-gauge pole tramways laid over the tundra might in some cases be used in parts of the Seward peninsula for long hauls. They would be inexpensive of construction and maintenance, but would not compete with winter sled transportation, which varies from 30c. to 50c. per ton per mile.

In conclusion, I would say that of the three provinces of Alaska above specified the Central Yukon province is most in need of Federal aid for highway construction. Placer districts now lying idle could be made to support a numerous population, and if it be desirable that prospecting for new placer fields be stimulated, it is doubtful if any form of assistance to such prospecting could be given which would prove more beneficial.

NATURAL GAS IN ENGLAND.—A discovery of natural gas is reported in Buckinghamshire, in England. It was found while sinking a deep well by the Aqueous Works & Diamond Rock Boring Company, Ltd., of London.

FRENCH STEEL WORKS IN CANADA.—It is reported that representatives of the Compagnie des Produits Métallurgique are prepared to erect a steel plant at Ottawa or Montreal, provided that a rail contract is given to the company by government. The decision of the authorities has not been announced.

COAL BRIQUETTES IN INDIA.—During the year 1902, 13,400 tons of patent fuel were made in India. Khost (Baluchistan) produced nearly 7,000 tons, and Dandot (Panjab) over 6,000 tons. During the official year 1903-1904, 14,513 tons were manufactured at Khost with an outlay of Rs. 190,000. The fuel is used on the railways. There is a small plant also at Giridih (Bengal), but since the installation of modern coke-ovens it has been little used.

SWEDISH IRON ORE CONTRACTS.—A contract has just been closed for carrying 150,000 tons of iron ore from Lulea, in Sweden, to Rotterdam, and the rate is $1.23 a ton, which compares with $1.26 for the expiring year. It is also stated that orders have been given for three turret steamers for Swedish owners. These steamers will be built by Messrs. Wm. Doxford & Sons, Ltd., at Sunderland, and will be specially adapted for the Lulea and Narvik ore trades, in which trades the turret type has already been very successful.

ZINC AT BROKEN HILL.

By F. H. Bathurst.

The hall mark of Australian mining is the work done by the Broken Hill Proprietary Company, and no wonder, for this is one of the few mining companies in the world that have returned over £10,000,00 to its shareholders, without really calling up a penny. All that vast profit has been earned since 1885, and the mine to-day is only being developed at the 1,000-ft. level, no stoping having been done there yet—indeed, practically no extraction has taken place at the 800-ft. level. The policy of the directors is to have seven years work ahead. That they have to-day, and the way they are pushing the development enables the tally to be kept up despite the magnitude of mining operations that result in a steady output of 12,000 to 14,000 tons of ore per week. To pay its dividends the company since its inception has produced 662,303 tons (long) of lead, 6,600 tons antimonial lead, 4,564 tons copper, 3,524 tons of silver and 2½ tons of gold. What a record! and yet to-day the mine puts out on the markets of the world 1,400 tons of lead and 3 tons of silver week by week. Then, outside its reserves of ore underground, look at the wealth at the surface. There stacked is a heap of 2,000,000 tons of mill-residues, low in silver and lead, but containing about 18 per cent zinc all through. On this vast accumulation all the charges of mining have been paid, and it is fit for treatment by the Delprat salt-cake process for the recovery of zinc sulphide. This asset does not figure at all in the company's balance sheet, and it is being increased continually at the rate of, say, 8,000 tons per week. Is it a difficult problem, then, to estimate what are the possibilities of the Broken Hill Proprietary Company as a zinc producer? Actual work on a large scale has shown that an extraction of 85 per cent of the zinc contents of the tailing can be assured by the use of the Delprat process, and that the cost of treatment is only a fraction of a pound sterling per ton. The company therefore has, as an asset, its reserves underground of 4,000,000 tons of ore, and its reserve of 2,000,000 tons of residues ready for treatment at the surface. What man connected with mining would want much more than even a 2,000,000-ton ore reserve on the surface, already crushed and with its treatment solved? But outside of this the company has its mine. The strength of the company, therefore, is remarkable, and yet Australian investors always emit a sigh at the register, for they abhor any company with a Australians would feel safer if it was a 200,000 register, for they abhor any company with a big capital.

These facts are given because in two ways the company of late has emerged, so to speak, from its British banker-like obscurity. It is now fighting over the patent rights of the Delprat salt-cake process for the recovery of the zinc concentrate from the mill-residues. Its right to the process has been challenged by Potter, the patentee of the prior sulphuric acid process, who also claims that he has the master patent for the recovery of zinc sulphides by their flotation and separation from the gangue when the ore is mixed with an acid solution. The case is still *sub judice*, but the Proprietary people insist that they have not infringed Potter's process. So sure are they as to their ground that they are now treating 2,000 tons of quick residues per week and obtaining, as I have said, a recovery of quite 85 per cent. This means, however, that they are only handling a quarter of their weekly output of residues, and it illustrates that the company can, if it chooses, step into the zinc market with supplies that will surely prove an important factor. Imagine, if it is decided to extend the plant so as to treat 200,000 tons of residues yearly (4,000 tons per week); that would mean probably 70,000 tons of zinc added to the world's supply of about 563,000 tons, and it can be asserted most emphatically that were the litigation out of the way it would be an easy task for the company to do this.

But the policy of the company is not to flood the market. Its aim is rather to keep the total production of the whole of the Barrier mines down to about 70,000 tons of zinc. This is because there appears to exist a conviction among the company's officials that the metal market would not stand the strain of an addition of more than 70,000 tons of zinc per annum without a fatal sagging of prices. It is true that the chairman of the company (Mr. Harvey Patterson) takes a hopeful view, but some of the more prudent spirits do not quite think with him, that big zinc production will mean such an extended use of the metal as to stop serious market drift. It is on the cards, therefore, that at a very early date the company will ask for a conference with the directors of the other Barrier companies with the object of arriving at an agreement to limit the output of zinc concentrate. The present output of zinc (metal) as contained in the ore mined at Broken Hill by all the mines on the lode is 200,000 tons per annum. Mr. Delprat, general manager of the Proprietary, appropriately said recently, "this (output) was not wasted, but was put by for future treatment." Therefore the suggested conference of the different companies. And it can be safely said no more momentous conference of mining men ever will have been held in Australia. It is too soon to predict what will be the outcome, but it can be averred with safety that the feeling is for the companies to come into line. The companies unitedly have fully 5,000,000 tons of zinc-bearing residues lying at the surface ready for treatment, and they are adding to them weekly at the rate of from 18,000 to 20,000 tons—therefore the importance of the question of limiting the output; and it is a good thing to be able to say that business men will deal with the problem on cool business lines.

As an addendum to the foregoing I may give the weekly output of ore of each mine, the concentrate won and the total reserves of zinc residues. It may be taken that the residues average 18 per cent zinc:

Company.	Weekly output ore.[1] Tons.	Residues dump. Tons.
Proprietary	14,000	2,000,000
Sulphide corporation	3,800	850,000
South Broken Hill	3,800	650,000
Block 10	3,600	580,000
Block 14	Not working.	200,000
British	2,500	200,000
Junction	Not working.	100,000
Junction North	Not working.	100,000
North Broken Hill	2,000	150,000

[1] It takes, roughly, 5.5 tons ore to make one ton of lead concentrate.

In writing on this question I have not touched on the part magnetic separation is likely to play in the treatment of the zinc-bearing ores of the Barrier. The fact that the Odling separator can work on 'wet' ore is an immense advance in that method of dealing with the lode material, for the dust nuisance with the dry separator is always present in a more or less pronounced form. A trial of the wet separator will be made at the Block 10

mine, in the course of a month, on a big scale, and if it answers well and works cheaply a revolution may take place in the treatment of ore at Broken Hill. The idea is to put the wet separator next to the coarse jig, which takes out the bulk of the lead, and to let it eliminate the rhodonite, leaving the zinc sulphide and the rest of the galena and silver to be separated later by ordinary concentrating appliances, thus saving in the one continuous operation not only more of the lead and the silver, but also the zinc. With the dry magnetic separator the scheme of work would be to take out, as is done by the Ullrich separator, the rhodonite and the zinc, and then to let the crushed galena with the quartz gangue go to the jigs and vanners for treatment in the usual way. By either of these magnetic methods the acid or salt-cake process would then be reserved entirely for the treatment of the existing zinky dumps. To many the introduction of the magnetic separator in the scheme of concentrating work is the ideal method of dealing with the Broken Hill ores. But that point will not be satisfactorily cleared for some little time by actual results, not until the costs can be compared with those of concentration on present lines, the zinc passing into the dumps with the intention of extracting it later through the application of the salt-cake process.

METALLIC CALCIUM.—Metallic calcium is now produced by the electrolysis of fused calcium chloride. The generating cell is so constructed that after the action begins a solid stick of the metal itself serves as the contact cathode. Other similar metals may be produced in like manner. Calcium is decomposed by water, though not as violently as sodium and potassium; and, though abundant in nature, its production in the free metallic state has been a rarity till recently. Its applications may prove both numerous and valuable.

THE NEW CHLORINATION.

By WILLIAM E. GREENAWALT.

Both cyanidation and chlorination are applied to Cripple Creek ore in custom mills which compete for the same business. Not many years ago the tonnage treated by the cyanide process exceeded that which went to the chlorination mills. At present, only one cyanide plant is working on custom ore, although there are several mills at the mines using cyanide to treat the accumulated dump material and low-grade oxidized ore. Several years ago the largest cyanide mill was acquired by the company which now treats most of the output of Cripple Creek, and dismantled. This would indicate that as a cold commercial proposition, chlorination has stood the test and has come out victorious.

It has been claimed that the pendulum will again swing backward and that cyanide will recover the supremacy. My own impression is, that, after the dump material and low-grade oxidized ores are exhausted, so that the ore must all be roasted before going to any chemical process, cyanidation, on Cripple Creek ore, will be a thing of the past. I am aware that one of the present tendencies of the cyanide process is to dispense with roasting entirely by crushing to an exceeding degree of fineness. Prof. S. B. Christy[1] made some cyanide experiments on a concentrate, of varying degrees of fineness, with the following results:

	Per ton.
The coarsest tailing assayed	$27.00
with an upward velocity of about	
2 in. by hydraulic sizing	19.63
1 in. by hydraulic sizing	19.01
½ in. by hydraulic sizing	14.00
¼ in. by hydraulic sizing	6.61

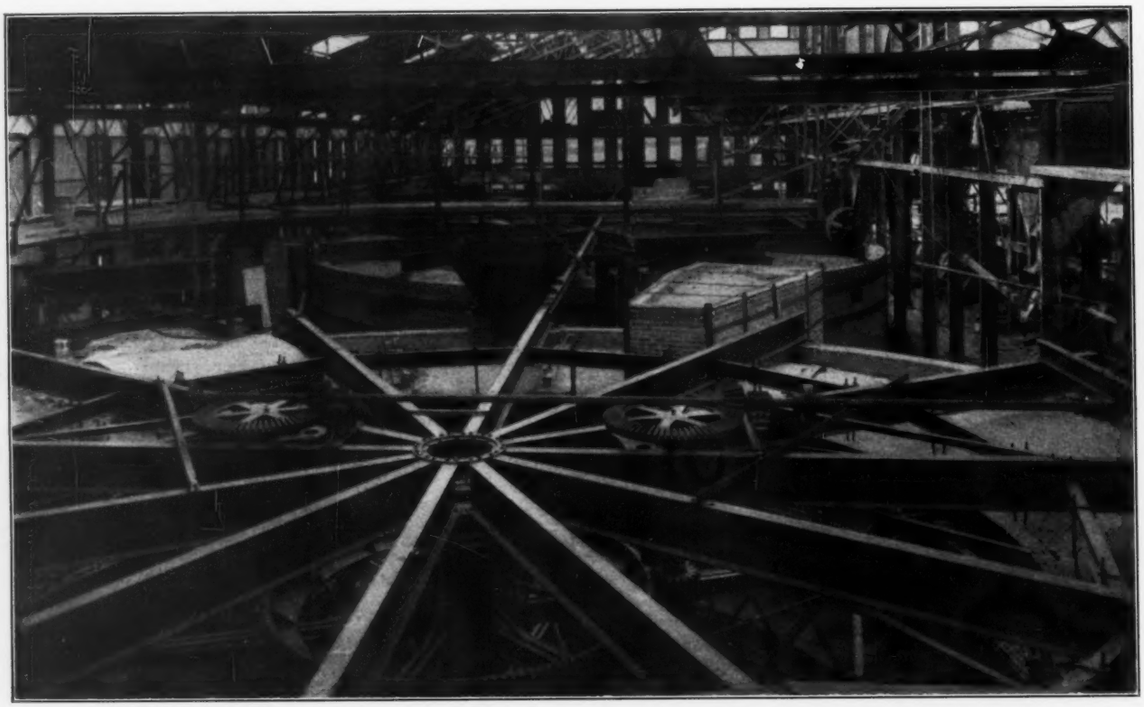
The slime which settled against an upward velocity of less than ⅛ in. per sec. assayed only 60c. per ton. The original value of the concentrate was $25 per ton; it had been treated three days with a 0.2 per cent cyanide solution. Prof. Christy then remarks: "This goes to show very clearly indeed that coarseness of the sulphurets[2] is an insuperable obstacle to the thorough and rapid extraction of the gold."

Mr. E. J. Bonstell[3] determined the same fact. His observation on 'sulphurets' treated eight days with 0.25 per cent solution was: Original value of 'sulphurets,' $36.38; tailing, $16.95; extraction, 53.13 per cent. The tailing was sized and assayed with the following results:

	Per cent.	Gold value per ton.
No. 1 retained on 60-mesh screen	12.10	$27.57
No. 2 " 80 " "	6.80	25.22
No. 3 " 100 " "	11.69	21.49
No. 4 passed through 100-mesh	69.40	12.40

He remarks: "It is very probable that the portion which would have passed a 150-mesh screen would have shown a very complete extraction." Mr. Joseph Smith's[4] experience is somewhat similar. He found that the fineness giving the best results with 'sulphurets,' was from 60 to 80 mesh. Mr. James,[5] speaking of Kalgoorlie ore, which is a sulpho-telluride resembling that of Cripple Creek, says, "The result of all the cyanide tests was to show that fine grinding (to pass a sieve of 8,100 holes to the square inch—90 mesh) was absolutely essential to success, and that agitation or intimate contact with the solution was also necessary."

In making numerous comparative tests on ore and mill-tailing from Cripple Creek, crushed to 8, 12, 16, 20 and 30-mesh with chlorine and cyanide, I found no appreciable difference in the respective processes in the material crushed to the different meshes, after the ore had been well roasted. In making screen determinations on the chlorination tailing of the roasted ore, it was found that the fine assayed



FURNACE ROOM, PORTLAND MILL.

[1] *Proceedings* California Mining Association.

[2] It is a matter for regret that well-informed writers should continue to use a term so obsolete and meaningless as 'sulphurets,' which may refer to plain 'sulphides' or more precisely to those sooty sulphides which have been partially oxidized to sulphate.—EDITOR.

[3] *Mining and Scientific Press*, April 16, 1904.

[4] Burfiend, *Mining Reporter*, June 23, 1904.

[5] 'Cyanide Practice,' page 90.

about the same as the coarse material—even as coarse as 8-mesh.

It is well known that roasting sulphide ore makes it more porous and puts it in vastly better condition for the solvent to penetrate. The conclusion is evident, that, while the coarser particles of raw sulphide cannot be penetrated sufficiently by the solvent to get a reasonable extraction, if the ore is roasted, this difficulty does not appear. What applies to the extraction on the various mesh determinations on the cyanide tailing from the concentrate previously cited, also applies in the same proportion to the ore itself, if an attempt were made to cyanide direct; that is to say, since the higher tailing is largely derived from the coarser concentrate, it is immaterial whether the sulphide is concentrated or not. If it is necessary to crush the concentrate to 60 or 100-mesh to get a good extraction on the raw sulphide, it will also be necessary to crush the ore itself to the same mesh to get a corresponding extraction.

Approximate size of product.	Approximate capacity per square foot per hour.	Relative capacity, taking 75 mesh as the unit.
10 to 12 mesh.	500 lb.	6.3
14 "	472 "	6.0
16 "	460 "	5.8
18 "	444 "	5.5
22 "	416 "	5.2
26 "	388 "	4.9
32 "	333 "	4.2
40 "	250 "	3.1
50 "	195 "	2.4
60 "	139 "	1.5
75 "	80 "	1.0
85 "	55 "	0.7
90 "	50 "	0.63
100 "	44 "	0.55
120 "	40 "	0.5

It will be seen that the capacity at 14-mesh is six times that at 75-mesh. This refers only to the relative screening capacity. Repairing and replacing screen-cloths of the fineness required to screen to 75-mesh would be an appreciable item, and the screening plant necessary to get a capacity of 100 tons per day would certainly be formidable. The screening and rehandling would be quite as serious a problem as the fine crushing.

FILTER-PRESS ROOM, CHLORINATION PLANT.

It would appear then that to get a good extraction by the cyanide process there are two alternatives: (1) exceedingly fine crushing; (2) roasting. In treating Cripple Creek ore, raw, by cyanide it would probably be necessary to crush it to at least 80-mesh (120-mesh has recently been suggested) to get an extraction equal to that obtainable by chlorination when the ore is crushed only to 12 or 16-mesh; or by the cyanide process when crushed to 24 or 30-mesh and preceded by roasting. These are the meshes ordinarily used in the mills treating Cripple Creek ore.

If a comparison is made between chlorinating Cripple Creek ore, and cyaniding it raw, it must be made on the basis of: chlorinating, crushing to 12 or 16-mesh and roasting; cyaniding, crushing to 60 or 80-mesh and screening. The screening is particularly mentioned in connection with the fine crushing, because screening to 60 or 80-mesh is a serious item. The screening capacities relative to the different meshes may be illustrated by tests made with dry granular ore on a Jeffrey Columbian vibrating screen.

It is well known that the difficulties in crushing increase enormously with the fineness. Where 100 tons of ore can be reduced to 12-mesh, sufficient for chlorination, only 40 tons can be reduced to 30-mesh. If 30-mesh is largely exceeded, crushing with rolls is difficult. One of the largest companies manufacturing metallurgical machinery in the West, and whose rolls are now in general use in the mills treating Cripple Creek ore, recommend that if it is desired to crush finer than 40-mesh, rolls should not be used. It is safe to say, therefore, that cyaniding raw by crushing to 60 or 80-mesh, so vastly exceeds the extra cost of roasting in the chlorination process that a comparison would be ridiculous. It seems also unnecessary to even allude to the difficulties in treating this material after it is crushed. All the ore would be reduced to a slime, and the successful and economical working of large quantities of slime presents its own difficulties.

It remains, therefore, to make a comparison between: chlorination, crushing to 12 or 16-mesh and roasting; and cyanidation, crushing to 24 or 30-mesh and roasting. To the average man, uninitiated into its difficulties, the cyanide process is so easy and simple that any novice can handle it. One seems to think that all that is necessary is to dissolve a little cyanide in water, percolate it through the ore, run it over zinc shavings and melt the gold. Just as in the chlorination process, many seem to think that all that is necessary is to apply a little chlorine, or chlorine-generating chemicals, to the ore and precipitate the gold with hydrogen sulphide or ferrous sulphate. But those who have had actual experience know that both processes have their peculiar metallurgical and chemical difficulties; although it is generally conceded that the chemistry of cyanidation is much more involved than that of its competitor.

In the chlorination process there is no particular difficulty in precipitating to a trace, by means of hydrogen sulphide, charcoal, or ferrous sulphate. In the cyanide process, it is well known that thorough precipitation is one of the serious difficulties, and that the process often fails on that account. Putting aside a comparison of the more subtle chemical difficulties, and comparing the extra cost of crushing in the cyanide process to 24 or 30-mesh, as compared with 12 to 16-mesh in chlorination, it is evident that any small saving made in chemicals or quiescent treatment by cyanide is fully counterbalanced by the increased cost of crushing. The barrels used in chlorination can be charged and emptied cheaper than the vats in the cyanide process. It is also generally conceded that chlorine extracts a higher percentage of the values than cyanide under the conditions obtaining in practice.

It is true that within the past few years wonderful strides have been made in the application of cyanide; but this is equally true of chlorination. With the use of electrolysis in the generation of chlorine and its application to the reduction of gold ores, the cyanide process, which has not been able to hold its own, even against the crude expensive method of charging the barrels with bleach and acid (9 lb. of corrosive chemicals to get one pound of

available chlorine), can no longer compete successfully against the electrolytic chlorination process. With the general introduction of electrolytically generated chlorine, the cost of the chemicals, which is now 75 to 80c. per ton, will be reduced to 15 or 20c. per ton, or possibly less than 10c. It may even be an asset. This represents a positive saving, and is not dependent upon the condition of the material, increased extraction, or other contingencies.

Salt is decomposed by electrolysis into its constituents, chlorine and sodium. This may be done either in fusion or solution of the salt. Both methods have proved commercially successful in the manufacture of bleaching powder and caustic soda. Fully 50,000 h. p. per day is now used in this industry in various parts of the world. By the wet method, the sodium released from the salt combines with the water in the negative compartment of the cell, producing caustic soda and hydrogen. The entire decomposition is represented by the equation: $NaCl + H_2O = Cl + NaOH + H$. Comparing the chemical with the electro-chlorination process, the charge of 15 lb. of bleach and 30 lb. of sulphuric acid is taken, and the average amount of chlorine in the bleach is 33 1/3 per cent or 5 lb., which is the average from numerous determinations. Neither the bleach nor the acid has any beneficial effect in the chlorination of gold ore; their presence is usually harmful. Bleach is simply a convenient medium to handle and transport chlorine. Salt, being a stable definite chemical compound, always contains about 60 per cent chlorine, if reasonably pure. Nine pounds of salt will give 5.4 lb. of chlorine. Salt, of the best quality, can be delivered to the Cripple Creek mills for $10 per ton, or .5 cent per pound.

The comparison in the cost of chemicals alone, therefore, stands: By the chemical process, bleach 15 lb. and acid 30 lb., 75 cents; by the electrolytic process, salt 9 lb., 4.5 cents. It takes power to decompose the salt. With an electrolytic cell working at five volts it will take 2.5 h. p. to liberate one pound of chlorine per hour by electrolysis (the theoretical voltage is 2.3; cells in ordinary practice vary from 3.4 to 5 volts). To liberate five pounds of chlorine, therefore, will require 12.5 h. p. It is fair to assume that in an ordinary good steam-plant five pounds of coal at $2 per ton will generate 1 h. p. To liberate five pounds of chlorine will take 62.5 lb. of coal, costing in all 6.3c. There would, of course, be a small extra expense per ton of ore for operating and repairs. This would be fully covered by 4.3c., since the process is entirely automatic. The total cost of chlorine by the electro-chlorination process would then be: Salt, 4.5c.; power, 6.2c.; operating and repairs, 4.3c.; making a total of 15 cents per ton of ore, as compared with 75 cents by the chemical method.

It is evident that the chlorination process, which has been able thus far to hold its own against all competitors, will be able to do so with vastly greater ease when the cost of the chemicals is reduced to 15 cents or less per ton. Moreover, the adoption of the electrolytic process by one chlorination plant will, for the same reason, oblige the other chlorination mills to follow suit. No company can successfully compete against another with a disadvantage of 60 cents per ton on every ton of ore treated.

It was stated that caustic soda was produced simultaneously with the chlorine in the electrolytic decomposition of salt. About eight pounds of caustic soda are produced with seven pounds of chlorine. For every 100 tons of ore treated, using 500 lb. chlorine, there would be produced 640 lb. caustic soda, or about 1,000 lb. of 60 per cent purity. This caustic soda could be made worth from 1.5 to 2c. per pound after paying for the expense of evaporating and refining, or from $15 to $20 per day. This would just about cover the total expense of generating the chlorine used in the reduction of the ore. The manufacture of caustic soda in connection with the electrolytic process, is feasible only when the mills are large and properly located. Ordinarily it would be wasted; if low-grade oxidized ore or dump material is available for cyanide treatment without roasting, the caustic may be used as an alkaline wash, instead of lime, although lime is usually preferred.

In conclusion I desire to pay a tribute to the work also done by my brother, John E. Greenawalt, who for many years has been an indefatigable worker in this peculiar field, and I think, is entitled to the credit of being the pioneer in this work.

INDIANA COAL MINES.

The report of the State Mine Inspector of Indiana, Mr. James Epperson, which has just been issued, shows that the total coal mined in 1903 was 9,992,553 tons, an increase of 1,229,356 tons, or 14 per cent, over the previous year. This increase was due partly to good demand, partly to the general absence of strikes, and partly to the opening of new collieries. There were 37 new mines which began production during the year, three being in the block coal district and 34 being bituminous mines.

The following table shows the tonnage of coal mined and the forms in which it was shipped or used, distinguishing also pick-mined and machine-mined coal:

	—Pick—		—Machine—		—Total—	
	Tons.	Per Ct.	Tons.	Per Ct.	Tons.	Per Ct.
Scr'ned or lump	2,640,465	40.1	1,240,069	36.4	3,880,534	38.8
Slack and nut	1,147,965	17.4	605,210	17.8	1,753,175	17.5
Run-of-mine	2,800,045	42.5	1,558,799	45.8	4,358,844	43.7
Total	6,588,475	100.0	3,404,078	100.0	9,992,553	100.0
Proportions		66.0		34.0		100.0

Of the total coal mined, block coal constituted 1,025,940 tons, or 10.3 per cent, the remaining 8,966,613 tons, or 89.7 per cent, being classed as bituminous coal. A much larger proportion of bituminous was machine mined than of block coal. The total wages paid in machine mines were $3,670,188, an average of $1.08 per ton; in pick mines, 5,479,384, or $0.83 per ton; the total wage payments being $9,149,572. Of these payments, $6,017,021 were to miners, and $2,085,116 to other employees inside mines, a total of $8,102,137 for inside work; the remaining $1,047,435 being to outside, or surface employees.

The type of machine most favored in Indiana is the electric chain cutter, of which 235 were in use last year, as compared with 82 compressed-air machines. The total number of employees at the mines being 15,128, the average coal mined per man was 660.5 tons. There were 327,820 kegs of powder used in blasting, showing an average of 30 tons of coal mined per keg, or 3.33 lb. of powder used to the ton.

The total number of employees in the mines is given as follows:

	No.	Per ct.
Pick miners	7,808	51.6
Machine miners and helpers	588	3.9
Loaders	2,232	14.8
Other inside workers	2,981	19.7
Total inside, or underground	13,609	90.0
Outside, or surface, men	1,519	10.0
Total employees at mines	15,128	100.0

The average coal mined per man employed was 660.5 tons. The mining scale shows that the rates paid in block coal mines were $1 for pick and 78.5c. for machine mining; in bituminous mines, 90c. for pick and 68.5c. for machine mining. The average earnings of mine employees are computed at $604.14, an increase of $65.37 over the previous year.

The number of casualties to mine employees and their causes are shown in the following table:

Cause.	Fatal.	Serious.	Minor.	Total.
Falling slate	17	64	27	108
Falling coal	1	16	5	22
Mine cars	5	40	18	63
Caught by cage	3	3	5	11
Kicked by mule	..	..	2	2
R.R. cars	1	..	2	3
Windy shots	2	5	..	7
Delayed shots	4	1	1	6
Premature shots	5	7	..	12
Smoke explosion	..	10	..	5
Shot blowing through pillar	1	1	1	3
Suffocated	3	..	..	3
Powder explosion	4	2	..	6
Explosion of kerosene	1	..	..	1
Gas explosion	1	3	..	9
Mining machine	..	..	2	2
Fell down shaft	5	..	..	5
Coal falling down shaft	..	1	1	2
Electric shock	1	..	..	1
Miscellaneous causes	..	2	3	5
Total	55	145	77	277

The average casualties per 1,000 employees were: Fatal, 3.64; serious, 9.58; minor, 5.09; total, 18.31, of all classes.

The report comments on these statements as follows: "The increased number of casualties in 1903 is attributable, in some measure at least, to the number of new mines that have been opened, thus affording more avenues of danger; there being more coal mined, necessitating the employment of a greater number of miners and other mine employees; also the use of more explosives; all of which are important factors in the history of mine accidents. The prime factor, however, is the use, or, in a majority of cases, the misuse, of these explosives.

"In making an inspection of a mine recently, I overheard a miner remark that 'powder was cheaper than muscle.' This seems to be the maxim of the average miner to-day, hence the increase in the number of mine accidents.

"In the report for the year 1901 we made the statement that at least 50 per cent of the mine accidents for that year were due, either directly or indirectly, to the use of powder; by smoke explosions caused by a number of heavy shots being fired simultaneously; by premature and delayed shots, also by windy or blown-out shots, the latter being caused by shots that were either misplaced or overcharged; all of which is very destructive to the safety of the miners and the property of the mine owners.

"It will require but a brief review of the table of causes and the description of casualties occurring in 1903 to substantiate the fact that the above statement will more than hold good for that year.

"Of the 34 fatalities, as shown by the table, 19, or 35.7 per cent, were due directly to the use of powder and other explosives, while 17, or nearly 31.5 per cent, were due to falling slate. Conservatively speaking, at least one-half of the latter number would have been avoided had the most ordinary precaution been taken in examining the roof after shots had been fired, and by re-setting props which had been knocked down by coal thrown from such shots. All of such precautions are incumbent upon the miners for their own safety.

"While discussing this subject, it will not be amiss to mention two other factors that have played important parts in connection with the fatal and serious accidents that have occurred within the past three years—dyna-

mite and fuse—the former being used in conjunction with blasting powder, resulting in almost every instance in an overcharged shot, while the use of fuse in preference to squibs has been the cause of accidents in many ways, such as delayed or premature shots.

"The great danger in this practice is the fact that the shot firer will commence lighting shots at the head of an entry, and continue from one room to another as long as there are any shots to light in that part of the mine, and the fuse on which the shots are tamped being cut at different lengths, will occasionally result in a dozen or more exploding simultaneously, causing a severe explosion, or an accident from the extra heavy concussion.

"Both of the above practices cannot be condemned too severely, and there should be laws enacted prohibiting the use of either dynamite or fuse in blasting coal."

EFFICIENCY OF STEAM ENGINES.—Mr. C. O. Mailloux, in the course of the discussion on steam turbines at the recent meeting of the American Street Railway Association, at St. Louis, stated that in Berlin there is a triple-expansion, four-cylinder reciprocating engine of 5,000 h.p., which in running at very nearly full load has developed one horsepower-hour for something less than 9 lb. of water per 1 h.p., with superheat up to 600°. This is possibly the best on record in steam engineering practice. However, this engine has 16 valves, complicated mechanism, and requires a great deal of lubrication, wherefore the cost of attention, maintenance, lubrication, etc., may make it really less economical in total cost than some other engine using more steam.

NEW GOLD PLACERS IN GEORGIA.—These are situated in Harlson county, Georgia, on the Tallaposa river, 12 miles from the town of Buchanan. The quartz gravel in the ravines and river bottoms has been deposited by fluviatile action; it is water-worn, and rounded to subangular form, and the deposits are from a few inches to 2 ft. in thickness. The gravel on the hillsides, at and near the large veins of quartz, is angular, there having been no glacial action in this part of the South. The bedrock is a schistose and talcose slate, decomposed on top and hardening as depth is attained. The pay-gravel, pronounced by some of the Georgia experts to be from 2 to 12 ft. in depth, only shows this where the water has cut out the bedrock, and later filled in with the granular quartz; outside of these depressions the depth to bedrock will not exceed one foot. There are large veins of white quartz in a schist formation that give an assay value of $6 per ton. Near these veins, and in the draws and ravines, an accumulation of this quartz has occurred, making a natural riffle for the gold that has later washed down the slopes, the disintegration of the vein all the time adding to the richness of the gravel deposits. By panning in these concentrations, one is led to believe the country to be rich in gold, as some rough coarse gold can be found near these veins, but a few hundred feet below the gold is finer, and on the flat or bottom lands only a few fine specks can be found.

According to the calculation of chemical geologists, titanium is more abundant in the crust of the globe than carbon.

THE FAIRBANKS DISTRICT, ALASKA.

By W. M. Brook.

Every steamer coming to Seattle from the North brings news confirming recent reports about the Fairbanks camp. It is on the head waters of the Tanana river. The town of Fairbanks is situated at the head of steamboat navigation and from 12 to 25 miles distant from the diggings. Sixty paying claims are being worked in about equal numbers on Cleary, Pedro and Fairbanks creeks. The claims run 1,320 ft. in length with an area not exceeding 20 acres. The accompanying sketch map shows the position of the Tanana river and its tributaries.

Miners who have been at work in the camp all season estimate the output for the year at $500,000. Miners' wages are $1 per hour. This scale will probably be maintained until navigation opens in the spring.

In many respects the placer deposits are identical with those of the Klondike region. They are in perpetually frozen gravel. On the claims now being worked the gravel is from 15 to 30 ft. to bed-rock. The enormous bodies of gravel showing good pay have attracted many of the old Yukon miners from Dawson.

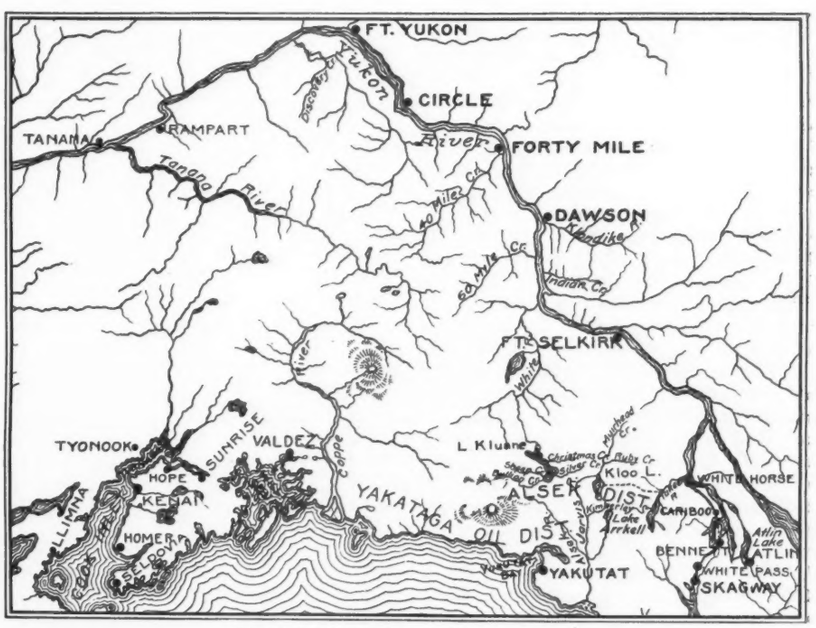
A Fairbanks merchant bought a half interest in a claim for $500, without prospecting. After putting a shaft down to bedrock and washing out the gold from the gravel, on the strength of his clean-up the adjoining unprospected claim was sold for $30,000. A two-thirds interest in No. 10 on Cleary creek has been sold for $85,000. The timber belts in the camp are sufficient to meet all the requirements for fuel and lumber. The cost of transportation from Fairbanks to the mines, so far established, has been 1c. a pound per mile. About 10,000 tons of supplies were landed by the steamboats this past season for Fairbanks. The population of the camp has been variously estimated from thirty-five hundred to five thousand. About two thousand more have come out for the winter.

There is a distinguishing feature about this camp well worthy of special mention. I question whether the history of placer gold mining records a single instance where a new field has had so large a percentage of miners who have been so well prepared to meet successfully so many adverse conditions.

Several million dollars' worth of the golden metal will surely be recovered from the new discovery next season. Mr. Ernest Andrews, manager of the company operating the most extensive mines in the Klondike section, commenting on this district, said: "The Tanana is bound to be a hummer next season. The miners have gone there well equipped. From all accounts I have heard the prospects are rich. It has caused a great scarcity of labor for our Dawson mines."

The government mail and telegraph route overland from Valdez, Alaska, will be used next spring by several thousand incoming miners. Most of the Alaska steamship lines have their terminus at Seattle, Wash. As a natural consequence the majority of people going north leave from that seaport.

STORING COAL UNDER WATER.—The British Admiralty experiments with submerged coal, which commenced at Portsmouth about 18 months ago, have been resumed. In May, 1903, five crates of coal, each holding two tons, were sunk in No. 2 basin, and a similar quantity was placed at the coaling point in small heaps, covered with tarpaulins. Six months ago some of the submerged coal was raised and burnt, in conjunction with a similar quantity of that which had been kept on land, and the results showed that the submerged coal had greater calorific qualities. A similar test is to be made on the present occasion.



SKETCH MAP SHOWING TANANA RIVER.

COAL IN SOUTH AFRICA.—Hitherto, the only portions of the Orange River colony in which any coal mining of consequence has been done are those in close proximity to the Transvaal goldfields, but quite recently several valuable coalfields have been discovered along the railway connecting Bloemfontein with Johannesburg, and there is every likelihood of several important colliery concerns springing up in the neighborhood of Wolvehoek.

THE AUSTRALIAN COAL TRADE CRISIS.

By JOHN PLUMMER.

The repeated disputes between employers and employed in the Australian coal-mining industry are having a most injurious effect upon the work of production. In western Australia and Victoria the demand of the miners for the minimum wage has tended to discourage the investment of capital in promising undertakings, while in New South Wales the general unwillingness of the employed to accept unfavorable decisions of the State Industrial Arbitration Court constitutes a source of considerable anxiety to employers. The main cause of trouble consists in the difficulty of fixing the selling price of coal indefinitely. The mining rate is regulated by the selling price of coal, and there is usually an agreement that the selling price, and, consequently, the mining rate, shall be maintained during a certain fixed period, say, twelve months. In the Newcastle district, several of the colliery proprietors have, in consequence of the competition of other countries, been selling coal at 8s. per ton, but continuing to pay a mining rate on the basis of 10s. per ton, thus meeting considerable loss. Accordingly, the chief sufferers decided that in future the mining rate should be on the basis of 9s. per ton, which they regarded as a fair compromise. But the coal miners refused to accept the reduction, and insisted that the terms of the existing agreement should not be departed from until it expired, on December 31, 1904. In this they were supported by a decision of the Arbitration Court, which held that the agreement could not be departed from except with the consent of both sides. At first the operators were inclined to close the collieries, but finally it was decided that they should give notice of a reduction, commencing on January 1, 1905. Thus the matter stands at present.

The difficulty has become accentuated by the intrusion of the Socialistic element, many of the unionists being in favor of nationalizing the coal-mining industry, as in New Zealand, a step favored by the ex-Federal Prime Minister and his followers. In the meantime the employers find themselves confronted with shrinking markets and a falling off in freights. During the first nine months of 1904 the coal exports from Newcastle (2,226,370 tons) showed a decline of 407,301 tons, as compared with the corresponding period during the previous year; California accounted for 127,067 tons, and the Hawaiian Islands for 88,646 tons of the deficiency. In not a few markets Japanese coal is being offered at rates lower than those asked for the Australian article, and now that the Japanese collieries are being worked by private enterprise, a large annual increase of output is inevitable. Australian coal miners refuse, however, to recognize the serious nature of the competition with which their industry is threatened, although the decreasing number of coal cargoes leaving the port of Newcastle furnishes an instructive object lesson.

Should the threatened reduction of the mining rate at the beginning of next year be resisted, the colliery proprietors will prepare for the introduction of coal-cutting machinery on an extensive scale. Already a satisfactory commencement has been made, and it has been estimated that the general use of machinery would enable the selling price of coal to be reduced to 7s. per ton, and yet leave a fair profit. It would also enable Australian coal to be shipped to San Francisco and other American ports, despite the import duties.

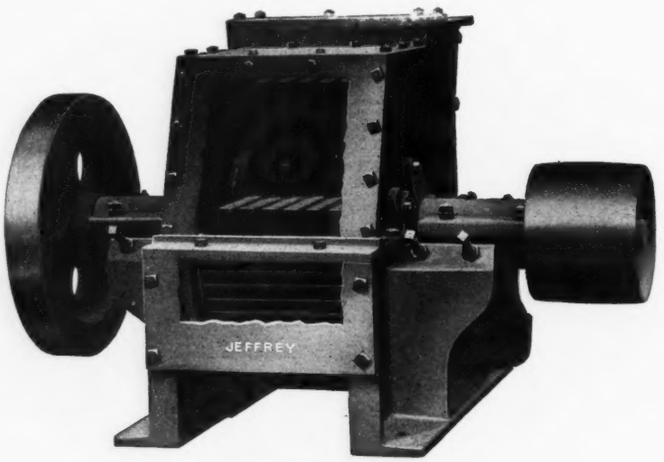
Should the use of coal-cutting machinery become general in the Newcastle district, it will be extended to other coal-mining areas in the Commonwealth, with the result that the output, encouraged by the enhanced demand occasioned by lower prices, will be increased. In 1902 the quantity of coal raised in the Commonwealth was 6,858,453 tons, of which New South Wales contributed 5,942,011 tons. The leading over-sea purchasers of Australian coal are Chile, New Zealand, the Philippines, California, India, Peru, Sandwich Islands and Java, smaller shipments being made to Hong Kong, Straits Settlements, Mauritius, Cape Colony, Fiji, Ecuador, New Caledonia, Celebes, Panama, China, Natal and Ceylon. The local consumption is largest in New South Wales, Victoria and South Australia.

THE HAMMER PULVERIZER.

The hammer pulverizer is a type of crushing machine which, perhaps, has not received the attention it deserves. For certain classes of material it possesses advantages which no other crusher can equal. For coal, clay, shale, some kinds of rock and other materials, it is one of the simplest and most efficient machines which can be applied. The Jeffrey Manufacturing Company, of Columbus, O., has lately acquired the Schoellhorn-Albrecht patents, and is now manufacturing pulverizers of this type. One of these machines is shown in the accompanying engraving, with the casing removed, in order to make the construction clear. The two smaller engravings show the sectional screen which is one of the special features of the machine.

Some of the strong points claimed by the makers are the simple form of the beater hammer, the adjustment of the beater arms to accommodate wear, and the V-shape bar-screening surface. Other features are the strong and substantial dust-proof pillow blocks, which are readily adjustable, and the top-feed hopper which provides large capacity and permits the material to be partly crushed while in suspension. The inner parts of the machine are all readily accessible. It is only necessary to take off the rear plate and the hand-hole plates on the side of the machine to change the beater arms and the screening surface at any time. The screening surface is made up in sections, so that the work of changing from one size mesh to another, or of replacing a screen, can be done in a very short time.

A large number of these machines are already in use, so that their operation and capacity are well known. They are made in many sizes to suit the various requirements. For instance, in coal, the capacity varies from 50 to 100 tons per hour, the quantity depending chiefly upon the degree of fineness desired. In harder material, such as rock, the capacity of the machine shown will vary from 10 to 25 tons per hour, according to the nature of the material and the fineness required. The manufacturers make free crushing tests for interested parties, who are thus able to see what work the machine is capable of doing.



HAMMER PULVERIZER.

SCREENS FOR PULVERIZER.

A NEW SOURCE OF GARNET.

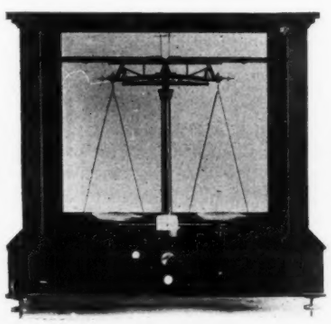
The use of garnet as an abrasive is firmly established in certain manufacturing industries, and there is little doubt that this material will continue to find favor, notwithstanding the great expansion in the utilization of other abrasives, particularly corundum and carborundum. In the United States the production of garnet now amounts to over 4,000 tons yearly, and the value of the yearly product approximates $150,000. The principal supplies hitherto have been derived from the Adirondack region of New York, smaller quantities being obtained from Pennsylvania, Connecticut and North Carolina. With the opening of some new quarries in the last-named State a larger output may be expected in the future from that section of the country. The properties, which are owned by the North

Carolina Garnet Company, are situated near Marshall, in Madison county. The garnet is of the almandine variety, and occurs in a band of chloritic schists, about 20 ft. wide, that can be traced on the outcrop for nearly a mile. The crystals are of large size, averaging 2 in. in diameter, and often exceeding this limit. While somewhat altered to chlorite near the surface, the garnet in the deeper workings is perfectly fresh, and breaks into clean, sharp particles, so that a very pure abrasive material can be obtained. Its hardness, according to the usual scale, is about 7.5.

The property is well situated for railroad transportation, being on the main line of the Southern Railway running from Salisbury, N. C., to Chattanooga, Tenn. Active quarrying was begun in January of the present year, since which time a large quantity of garnet has been taken out and shipped to market.

A SHORT-BEAM ANALYTICAL BALANCE.

The accompanying illustration shows a new analytical balance recently designed and placed upon the market by William Ainsworth & Sons, of Denver, Colo. In this balance a number of improvements suggested by experience have been made. Among these may be mentioned the beam, which is made of hard-rolled nickel-aluminum instead of pure cast aluminum as is usually supplied. Its design enables it to maintain its adjustment throughout a wide range of temperature and still have ample strength to carry 50 per cent more than its rated load. The rider apparatus is of improved design and so constructed that the rider arm, or carrier, cannot touch the beam, and, if need be, the rider can be taken off and replaced in the dark without dropping it off the rider carrier, or knocking it off the beam. The hangers are of skeleton construction, similar to those used on the button balances; and they have a maximum carrying capacity with a minimum amount of weight. Two sensitive levels are set in the metal base in front of the index and in plain view of the operator. The case is of French polished mahogany, with counterpoised sliding door in front and removable sliding door in back. A plate glass subbase covers the entire top of the base. All metal work is gold plated. In the illustration the counterpoised sliding door has been removed to illustrate the balance more clearly.



SHORT BEAM BALANCE

A gold medal has been awarded Wm. Ainsworth & Sons for fine balances and weights at the World's Fair in St. Louis.

In the eighteenth century there was not one refining furnace in Derbyshire, but there were scores of reverberatory furnaces.

BOOKS REVIEWED.

The Architects' Directory and Specification Index for 1905. Sixth Year. New York; William T. Comstock. Pages, 152. Price, $2.

This is a useful reference for all who may need the services of an architect. It contains a complete list of architects in the United States and Canada; list of architectural societies; specification index of manufacturers of, and dealers in, building materials. A number of additions have been made this year, increasing the usefulness of the work.

Notes on Assaying and Metallurgical Laboratory Experiments. By Richard W. Lodge. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 296; illustrated. Price, $3.

This manual is one of the most carefully compiled treatises that has appeared. Most of the book is devoted to the fire treatment of gold and silver, and the book fairly teems with the valuable and detailed suggestions of a teacher who thoroughly knows his business from the academic standpoint, though it is a pity that any writer on such a subject should not have had the advantage of some practical experience. On the whole, the book is a valuable contribution to the literature of assaying. The chemistry and the incidental theory are uncommonly well done. There is a chapter on the platinum metals, and the experiments, as far as they go, are well chosen. The book is entitled to stand on the shelves, or, better still —the highest commendation that any such book can have—it is entitled to lie on the working desk of every fire assayer.

Annual Statistical Report of the American Iron and Steel Association. Prepared by James M. Swank, general manager. Philadelphia; the American Iron and Steel Association. Pages, 94. Price, $3.

This report is well known from the previous yearly editions, and is really indispensable to all who are interested in the iron trade. The present volume includes all the points of the previous issues, with many new features. Special attention has been paid to the statistics of imports and exports of iron and steel, iron ore, manganese ore, coal and coke. Tables are given which show annual imports of iron and steel and also of tin-plates from 1872 to 1903; also the annual exports of iron and steel for the same years. Another table gives annual imports of iron ore since 1879. The tables relating to production of pig iron have been greatly extended. Coal and coke statistics are given in great detail. Full statistics are given of bessemer, open-hearth, crucible and miscellaneous steel castings. Full details are also given of the shipments of iron ore from the Lake Superior and other mines, the imports of Cuban iron ore, the prices of Lake Superior iron ore, the tonnage of steel vessels built in 1903 and 1904, immigration in 1903 and previous years, etc. The department which is devoted to prices has been enlarged to embrace the monthly prices of steel bars at Pittsburg in the last seven years and complete and authentic quotations of the monthly prices of tin-plates during the last few years; also prices of beams, channels, and steel plates in recent years. Tables showing the prices of bessemer rails in this country and in Great Britain for a long series of years, and also showing the miles of railroad in operation in the United States since 1830, and the displacement of iron rails by steel rails since 1880, will be found valuable for reference by railroad men. Tables showing the production of leading iron and steel products, iron ore, etc., by the United States Steel Corporation and independent companies in 1902 and 1903 are also given. Canadian iron and steel statistics, compiled from reports made by the manufacturers to the American Iron & Steel Association, are full and complete. The *Report* closes with statistical tables of the world's production of iron and steel and iron ore and coal in the latest years for which statistics have been received. The Necrological Record is continued for 1903 and 1904.

Mr. Swank's thorough acquaintance with the iron trade, and his long experience in the collection and presentation of statistics have enabled him to present the information in a compact and convenient form. It is safe to say that no other country has a report so nearly approaching completeness.

The Chemistry of Cyanide Solutions Resulting from the Treatment of Ores. By J. E. Clennell. New York and London; THE ENGINEERING AND MINING JOURNAL. Pages, 164. Price, $2.50.

In the preparation of this treatise the object of the author was to present a comprehensive review of the subject rather than the results of special researches. In carrying out this purpose short descriptions of the well-known methods are given, and where necessary a critical discussion of their value. Such criticism as we have to make upon the author's work is confined chiefly to his judgment in following these ideas. We feel that possibly the most approved methods have not always been presented with the minuteness of detail that in many cases would be useful; while, on the other hand, some of the more doubtful methods are described in paragraphs when a few lines would have been sufficient. However, this is a defect, if it be a defect, which does not materially detract from the value of the author's work to the great army of cyanide chemists who will be pleased to find in this volume a collection of substantially all the analytical methods that they are called upon to employ. There is no other compilation so nearly approaching completeness and such generally praiseworthy character, and we feel confident, therefore, that the work will receive the appreciation that it deserves.

The table of contents indicates the broadness of its scope. Following the introductory page and the enumeration of the ingredients of cyanide solutions that have to be estimated, the book is divided into classes, which are further subdivided into sections, and under the latter the various methods that have been used or proposed are described. The classes (I, II, etc.) and the sections (*a*, *b*, etc.) are as follows: I, Active Cyanogen Compounds: *a*, free cyanide; *b*, total cyanide; *c*, total cyanogen; *d*, hydrocyanic acid; *e*, available cyanide. II, Alkaline Constituents: *a*, total alkali; *b*, protective alkali; *c*, hydrates, carbonates and bicarbonates; *d*, ammonia. III, Reducing Agents: *a*, reducing power; *b*, ferro-cyanides; *c*, thiocyanates; *d*, sulphides; *e*, other reducing agents. IV, Auxiliary Agents: *a*, oxygen; *b*, active haloids; *c*, peroxides; *d*, ferricyanides. V, Inactive Bodies: *a*, cyanates and isocyanates; *b*, chlorides; *c*, nitrates; *d*, sulphates; *e*, silicates. VI, Noble

Metals: *a*, gold and silver together; *b*, gold alone; *c*, silver alone. VII, Base Metals: *a*, zinc; *b*, copper; *c*, iron, alkaline earths and alkali metals. VIII, Suspended Matter: *a*, total solids in suspension; *b*, various constituents in suspended matter; *c*, total solids in solution.

The work is one that we have pleasure in recommending, and we have no doubt that it will find the place in technical libraries to which its merit entitles it. W.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

Grundzüge der Kristallographie. By C. M. Viola. Leipzig, Germany; Wilhelm Engelmann. Pages, 390; illustrated. Price (in New York), $4.25.

Geological Survey of Canada. Volume XIII. Annual Report. Robert Bell, Director, Ottawa, Canada; Public Printer. Pages, 748; with maps and illustrations.

Smoke Prevention and Fuel Economy. By W. H. Booth and John B. C. Kershaw. New York; the Norman W. Henley Publishing Company. Pages, 194; illustrated. Price, $2.50.

Transactions of the American Institute of Mining Engineers. Volume XXXIV, 1903. R. W. Raymond, Secretary. New York; published by the Institute. Pages, 1110; illustrated.

Elements of General Drafting for Mechanical Engineers. By C. E. Coolidge and H. L. Freeman. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 56; with 21 large plates. Price, $2.50.

A Scientific Consideration on the Subject of Saving Fuel in Heating and Power Production. By J. M. W. Kitchen, East Orange, N. J.; published by the Author. Pamphlet, 32 pages; illustrated.

Italia. Revista del Servizio Minerario nel 1903. Prepared in the Ministry of Agriculture, Industry and Commerce, by the Mining Bureau. Rome, Italy; National Printing Office. Pages, 488; with five inset tables.

Notes et Formules de l'Ingenieur et du Constructeur-Mecanicien. Fourteenth Edition. Prepared by a Committee of Engineers of the Ecole Centrale des Arts et Métiers. Paris, France; E. Bernard. Pages, 1798. Price (in New York), $4.50.

United States Geological Survey. Production of Mineral Paints in 1903. By Joseph Hyde Pratt. Pages, 20. *Production of Steel-hardening Metals, including Nickel and Cobalt; Chromium; Tungsten; Molybdenum; Vanadium; Titanium; Uranium.* By Joseph Hyde Pratt. Pages, 32. Washington; Government Printing Office.

TESTS FOR AMMONIA.—Six convenient tests for ammonia are: (1) giving a pungent odor; (2) fuming with any volatile acid; (3) turning red litmus blue; (4) giving a blue color with a cupric salt; (5) giving a black precipitate with a mercurous salt, and (6) giving a white precipitate with a mercuric salt. The radical ammonium is tested by chlor-platinic acid, with which it gives a yellow precipitate.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the Editor.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Diamond Bits—A Correction.

Sir—In the JOURNAL of November 17 an item appears, in which it is stated that the maximum weight for carbon diamonds for diamond bits in drill work is 3.5 karats and the minimum weight is 1 karat. My experience in this matter, which extends over a period of 15 years and includes the drilling of the anthracite, bituminous, salt, iron, gold and silver measures of this country, as well as the gold measures of Africa, is that the size of the borehole and the known strata of rock to be penetrated govern the matter very largely. As is well known, the largest part of the expense of diamond drill work is the carbon diamonds used in the bit, which, at the present writing, cost from $40 to $65 per karat.

In all the diamond drill work I have done I have never used a carbon as large as 3.5 karat, and I do not think it is necessary, as I can always procure a good carbon of about 1 or 1.5 karat that will do the work just as well and as quickly, and at a much less expense. For the small-sized bits, say 1½ or 2 in., I use from a ⅝ to a ⅞ karat carbon, which always gives good satisfaction, lasts nearly as long, does the work just as fast, and is much easier to set. In case of breaking, replacing is far less expensive. I will also add that a good diamond-setter in this matter is cheap at any price.

Should any of your readers wish more information on this subject I would be glad to give it.

WM. M. STURGES.

Scranton, Pa., Nov. 21, 1904.

Books on Geology.

Sir—The writer is frequently asked by mining managers, superintendents, engineers, and other practical mining men where a good practical book on the geology of ore deposits can be obtained. This is a most difficult question to answer, especially to those living in the southwestern portions of the United States and Mexico, as the interesting local conditions of those regions have not as yet found place in any text book.

I think, however, that if any intelligent man will purchase the latest edition of Geikie's 'Text Book on Geology,' 1903, and read it by subjects, and not seriatim, he will be able to grasp at least the modern trend of this subject in its application to lode mining. The reader should digest the chapters pertaining to the conditions of the earth's interior, and the chapters, wherever found, relating to volcanoes; then the chapters pertaining to structure and mineral deposits. He should religiously avoid reading the chapters concerning petrography and the classification of igneous rocks, and those pertaining to the age of rocks, until the previous subjects are comprehended.

This course of reading, followed by the chapter by Kemp in the 'Mineral Resources' for 1903, will very nearly give an intelligent reader a comprehensive introduction to the geology of lodes as it is understood to-day.

This course should then be followed by the book of Spurr and the composite work on ore deposits by THE ENGINEERING AND MINING JOURNAL, and the volume on 'Theories of Ore Deposits' in the *Transactions* of the American Institute of Mining Engineers.

R. T. H.

New York, Nov. 20, 1904.

Dynamite in Mexico.

Sir—I do not know what your stand is on the tariff question, but no more lucid or convincing proof of who pays the duty placed by one country on the goods manufactured in other countries could be desired than the situation presented by the dynamite trade in Mexico; and it should prove, even to the man who runs, the great benefit (?) a duty on foreign goods is to the country levying it.

Prior to the time of the announcement that the Mexican Government would place a duty of $240 per ton on all foreign manufactured dynamite after October 1, 1904, Mexican miners paid an average price of $14 silver per box (28c. per lb.); but as soon as it was known that a duty was to be levied, the foreign manufacturers took advantage of it at once; and since then the Mexican miner has been paying $20 per box, 40c. per lb., for the same powder.

Does this $6 extra per box benefit Mexico or its people? The answer must be a strong negative; for it goes into the pocket of the foreign manufacturer, who is virtually "making hay while the sun shines."

When the Mexican manufacturers prove that they are able to supply the normal demand of the country, then, to *protect* this infant industry, the Government will impose the $240 per ton duty, which will preclude any attempt of the foreigner to ship his product to this country, for the native factories can always undersell him; and to make sure that the foreigner does not, and to increase his own profits, the native manufacturer will keep the, otherwise, $14 article at $20, and the native consumer pays the bill; and the native producer—a small interest compared to the consumer—pockets the 12c. per lb. extra profit.

The prime motive for imposing a duty on foreign goods should be revenue; but at the same time the inhabitants of any country should fully understand that any duty is simply an indirect tax on themselves, which they, as consumers, pay, although the prevailing idea seems to be that the foreign manufacturer pays it.

To those of us who give any thought to the subject it is very patent that all duties are, as I have just said, simply an indirect tax on the inhabitants of the country imposing them. When this tax goes into the national treasury, or part of it, it may be as well to collect the money in this way as in a more direct way, for many people like to be fooled. But in the case we have before us the Government will not get a cent, for the tariff is prohibitive. The native consumer will pay 12c. per lb. more for his dynamite than he would have to if there were a reasonable duty on it, and the native *protected* manufacturer will simply pocket an extra profit of $1,000,000 for the year 1905.

Protection of this nature must act as a boomerang on the country granting it; for, to the engineering line of thought, anyway, it would seem to be an axiom that the country imposing a duty, especially if it is high, pays that duty itself and the cost of collecting it besides.

Mexico's principal industry is mining, and it hardly seems wise to place this extra burden on it, when the government—the people at

large—reaps no benefit at all; for the nature of the transaction throws the whole *tax* into the coffers of the *protected* industry, which would prosper, even at the price at which dynamite was sold formerly by the foreign manufacturers.

To the thinking man, in any line of business, these few words should give cause for study and reflection.

E. A. H. TAYS.

Maconí, Queretaro, Mexico, Nov. 12, 1904.

[In response to our contributor's query as to our views on the tariff, we would reply that to us the tariff is a local question.—EDITOR.]

ABSTRACTS OF OFFICIAL REPORTS.

Dominion Iron & Steel Company.

This company owns an extensive plant for the manufacture of iron and steel at Sydney, Cape Breton, which has been in partial operation and under construction for several years. It also owns iron ore and other properties. The report for 1903 has just been published.

The liabilities include $20,000,000 common stock, $5,000,000 preferred stock and $7,946,000 bonds. The income account shows net profits from the works of $341,890; rents received, $8,037; total, $349,927. The charges against this were: Shrinkage in stocks, bad debts, etc., $226,313; interest, etc., $670,153; total, $896,466, leaving a deficit of $546,539 for the year.

The report of Manager Graham Frazer says: "In iron ore, our chief source of supply is the company's mine on Bell Island, Newfoundland, known as the Wabana mine. We shall take out this year about 315,000 tons, of which 115,000 tons goes to Europe, where it has been sold at fair prices, and the balance to our own works at Sydney. There is a ready market for it in Europe, so that we can always dispose of our ore whenever that is found desirable. The ore costs less than the original estimate.

"The valuable deposit of limestone on the company's property at Marble mountain, on the Bras d'Or lake, has fully maintained its good quality, and the supply is ample, but the cost has hitherto been too high. Our output for the current year will be about 150,000 tons.

"The coal received from the Dominion Coal Company requires to be washed, to reduce the sulphur and improve the structure of the coke, so that it will work economically in the blast-furnace. Our coal requirements, with two blast-furnaces running, are about 45,000 tons per month. A new washing plant has been erected during the past spring and summer, consisting of two units, each capable of washing 100 tons of coal per hour. It is now practically complete and washing sufficient coal for two blast-furnaces. The present 450 coke-ovens will not make sufficient coke to run three blast-furnaces, but I think it better not to build additional ovens until the effect of the washing plant is fully known.

"The company's four blast-furnaces are well equipped with modern machinery; two are in blast, one making foundry and the other basic pig iron. Five of the ten furnaces of the open-hearth plant are in operation, and doing fairly good work. The remaining furnaces are being overhauled, and the additional gas producers needed to complete the plant are under construction. The blooming mill is in good condition and of sufficient capacity to roll all the ingots we are likely to produce in the ten open-hearth furnaces. In order to get the best results and a sufficient and prompt supply of blooms for the billet and rail mills, it is necessary to remodel and enlarge part of the present heating furnaces. Plans for the work have been prepared, and the improvements may be completed by the time we are ready to operate the rail mill.

"The continuous billet mill, which was completed in April, will roll blooms into small billets without re-heating faster than the blooming mill can deliver them. The billet mill supplies billets to the wire-rod mill, also 1.5 to 3-in. billets for the market. The rod mill, which was also completed in April last, was designed to roll 200 tons per day, but has proved itself capable of turning out 250 tons. This mill has proved highly successful, and is making wire-rods of very satisfactory quality. The rail mill now being installed will have a capacity of 500 tons a shift. We expect to be ready to roll rails for next season's demands.

"The company's products now cover the following range: First—Basic pig iron made from Wabana ore without admixture, the only pig used by us for the manufacture of steel. Second—Foundry pig iron, made from Wabana ore alone, which produces cheaply an iron of better quality than Middlesbrough, England. Third—Foundry pig iron of higher quality, similar to Scotch foundry iron, made from Wabana ore with a percentage of low phosphorus ore mixed. The ore used for mixing has usually been brought from Spain; this year we bought 20,000 tons of Lake Superior. Fourth—Steel ingots, in manufacturing which pig iron made from Wabana ore alone is used. Fifth—Blooms, billets and slabs for sale, and billets for use in rod mill. Sixth—Wire-rods up to ⅜-in. diameter.

"In addition sulphuric acid and the by-products of the coke-ovens, tar, sulphate of ammonia, etc., are sold, and before long we shall add steel rails to the above list.

"Now that we can supply two blast-furnaces with coke made from washed coal we look for an improvement in practice and cost. Steel made from Wabana ore alone has proved to be of good quality; a large tonnage has been manufactured into boiler tubes, boiler plates, locomotive and car axles, angle plates, wire-rods, and all other products for which open-hearth steel is used. Our whole tonnage could undoubtedly be sold in Canada in the shape of rails, billets and wire-rods, but it may be found later on advantageous to instal the plate mill and 22-in. merchant mill, which the company has already purchased."

President Plummer's report says: "We have been working thus far chiefly to improve the quality and to reduce the cost of the pig iron and steel, and to complete the plant, so that the steel may be made into materials that can be profitably sold in Canada; we have partly accomplished what we deem necessary to these ends, and will complete it within the next few months. We look for good markets after the turn of the year. There is a large consumption in Canada, large enough to keep three or four such plants as ours in full operation. On one point I can speak very confidently, and that is the quality of our products. No one doubts the quality of our steel; our wire-rods have given entire satisfaction to our customers, and the results of the experimental lot of rails made from the steel confirm our belief that open-hearth rails will be found as much superior to bessemer rails as open-hearth axles are to bessemer axles. It has been thought advisable to keep the plant running during the past winter and spring, even if it did no more than pay operating expenses. The company is now doing somewhat better than this, but will not show any material excess over operating charges until the plant is all running."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Cryolite.—Can you tell me if cryolite exists, or has been found anywhere except in Greenland?—N. M.

Answer.—Cryolite in small quantities has been found in at least two places in Colorado. The deposit at Evigtok, in Greenland, is, however, the only one known where the mineral exists in sufficient quantity to be worked on a commercial scale.

Molybdenite.—I mail you under separate cover, a specimen of what appears to be plumbago, but its foliated character puzzles me. Can you enlighten me?—H. M.

Answer.—Your sample is a good specimen of molybdenite. This mineral closely resembles graphite and is often taken for it. Molybdenite leaves a bluish, or rather slightly greenish-gray trace on paper; on porcelain it leaves a lead-gray, slightly greenish streak. The faint greenish tinge, and its property of giving a sulphur reaction when fused with soda, furnish ready means of distinguishing molybdenite from graphite.

Bismuth.—Please give as definite information as you have at your command in regard to bismuth, especially its source, process and cost of reduction, where treated, value of ore, and market for same.—N. B.

Answer.—Bismuth is derived from several sources. Ores containing this metal are found in Saxony and other places in Germany, and constitute the chief source of supply. In this country, bismuth ore has been found in Arizona and at several places in Colorado. The only place where it has been mined is at the Ballard mine in Leadville, Colorado, and the quantity obtained there is not over 100 tons yearly. As to the cost of reduction, no figures are obtainable. The usual process consists in roasting the ore and then smelting in crucibles. A leaching process has been also tried. Most of the bismuth used, however, is obtained as a by-product in treating the ores for other metals. Metallic bismuth is used only in making alloys, especially certain white metal and bearing alloys. Its price is from $1.25 to $1.50 per lb. Several salts of bismuth are used in glass making, in coloring and in medicine.

As to the value of the ore, it is usually fixed by the buyers, according to assay. It varies from $8 to $15 per unit, being higher for better grades of ore. The lowest grade usually bought is 10 per cent.

The market is a very limited one, and is closely controlled, the demand being so small that it would not pay outsiders to attempt competition. The production and price of bismuth and its ores are under the control of Johnson, Matthey & Co., Ltd., of London, England, and

the government of Saxony—a combination of interests formed in order to maintain for the products a price at which the mines could be operated with profit. The supply of metallic bismuth far exceeds the demand, and unless the output were restricted, the price would fall to a point which would render the manufacture of the metal no longer profitable. The schedule of prices of ore is based on the market price of the metal.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

MINES UNDER TIDEWATER.—In answer to several inquiries received on this point, we quote the following from 'Lindley on Mines,' Section 429, second edition: "It follows from the doctrine laid down by the United States Supreme Court, that tide-lands bordering a territory cannot be acquired in private ownership under any of the general laws providing for the disposal of public lands, in which category are the Federal mining laws. A mining claim cannot be so located as to extend below the line of ordinary high tide.

"The discovery in 1898 of the auriferous sands on the southern shore of the Seward peninsula in Alaska, washed by the Behring Sea, attracted an army of fortune-hunters, and the beach in the immediate vicinity of Cape Nome was the scene of great mining activity. The Federal mining laws had been extended to Alaska, but as the gold-bearing sands were found to exist below the line of ordinary high tide, there was practically no law which permitted their appropriation of exploitation below that line. As in the case of discovery of gold in California, at a time when there was no Federal law whatever on the subject of acquiring public mineral lands, the miners adopted rules and regulations defining the manner of acquiring, possessing and enjoying mining privileges on beach claims. As it was conceived that a license could be obtained from the Secretary of War, whose permit was necessary as a prerequisite to the maintenance of structures in the navigable waters of the United States, such license was asked and in many instances obtained. These licenses, of course, conferred no rights save immunity from prosecution for carrying on mining operations in navigable waters. The roadstead was an open one, there were no harbor lines, and the permit was granted whenever applied for. These conditions were recognized by Congress, and provisions were inserted in the Alaska code governing the exploration and mining of these beach deposits, between low and mean high tide on the shores, bays, and inlets of Behring Sea, and authorizing mining below the line of low tide under such regulations as might be prescribed by the Secretary of War. This statute is, of course, local in its application. The code specifically sanctioned the adoption of local rules governing the size of the claims, and other details not necessary to be here noted. The act does not contemplate that these beach claims below the line of ordinary high tide shall be patented, the privilege being limited to exploration and mining for gold.

"Off the coast of California, at Summerland, in Santa Barbara county, petroleum wells are bored in the ocean below the line of ordinary high tide, and large quantities of crude oil are produced. The Secretary of War has granted the same class of permits as noted in the case of Cape Nome, which are, as heretofore observed, ineffectual as conferring any rights. The title to the soil is in the State of California. There is no permission granted by the State, but it has not interfered, and the occupants have not been molested by the only authority which possesses any power in the premises—the State of California. Some conflicts have arisen with the littoral owners, but that is not a matter which affects the mining rights."

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending November 22, 1904.

774,851. MEANS FOR SEPARATING NON-GASEOUS MATERIAL FROM A MIXTURE THEREOF WITH GASEOUS MATERIAL.—Arthur G. McKee, Cleveland, Ohio. The combination of a fixed upright gas-duct forming a passageway for the material to be separated, having a receiving-opening for such material, a discharge-opening for the gaseous material, and an intermediate enlarged portion; a positively driven rotary fan located in said portion; the wall of said duct adjacent to said discharge-opening extending up into said enlarged portion, and being imperforate, thereby providing around said wall an annular receptacle, separated from the gas-path, adapted to receive non-gaseous material, and not open to communication with the lower duct portion; and a discharge-chute communicating with said receptacle for removing said non-gaseous material permanently from the gas-path.

775,114.—LUBRICATING DEVICE FOR MINE-CAR WHEELS.—James N. Maxwell, Dawson, Pa. A lubricating device for a mine-car wheel, comprising a hub provided with a spindle-opening and an interior oil-chamber extending longitudinally therein, there being flutes formed in the oil-chamber and longitudinally disposed therein, a plurality of tubes mounted in and extended through the hub into the oil-chamber, the inner ends thereof being adjacent the spindle-opening, and a pair of boxes formed integral with the hub having oil-openings therein and extending inwardly to points adjacent the inner ends of the tubes.

775,123. APPARATUS FOR ELECTRICALLY TREATING GASES.—Kristian Birkeland, Christiana, Norway. The combination, with means for producing a magnetic field, of means for producing an electric arc in said field, and means for passing a current of gas into contact with and past said electric arc.

775,130. PULVERIZING-MILL.—John H. Elspass, Los Angeles, Cal., assignor to the Elspass Roller Quartz Mills and Manufacturing Company, Pueblo, Col. In a pulverizing-mill, the combination with a suitable frame, of a circular rotary mortar whose pulverizing face is highest at its outer edge and inclined downwardly to its inner edge, and pulverizing-rollers whose faces and axes are parallel with the pulverizing-face of the mortar.

775,137. APPARATUS FOR TREATING PEAT.—Walter T. Griffin, Limoges, France. In an apparatus for the treatment of peat, salt, etc., a conduit including a series of heating sections arranged in pairs, and a section having separating means leading from the exit end of one of the heating sections of each pair to the inlet end of the other heating section of the pair.

775,147. ORE-ROASTING FURNACE.—Andrew P. O'Brien, Richmond, Va. A roasting-furnace comprising a casing, a hollow shaft mounted therein, vertically arranged parallel flat partitions dividing the shaft into vertical compartments, rabble-arms extending into said shaft and through the compartment-walls, the said rabble-arms having internal air-passages for leading air from one compartment in the shaft through the rabble-arms to another compartment in the shaft.

775,151. STAMP-MILL.—Benjamin T. Scott, Los Angeles, Cal. In a stamp-mill, the combination of a stamp having a stem, collars rigidly secured to said stamp-stem, sliding collars on said stamp-stem one above and the other below the rigid collars; a frame slidably mounted on said stem intermediate said rigid collars; levers pivotally secured to said frame and extending inwardly toward said stem; links pivotally connecting the inner ends of said levers with the sliding collars on said stems; rods pivotally connected to said levers intermediate the ends thereof and projecting through said frame both above and below the same; nuts on the ends of said rods; springs on said rods, the outer ends of which bear against the nuts and the inner ends against said frame; means to reciprocate said frame.

775,153. DUMPING APPARATUS.—Richard H. Stevens, Munhall, Pa. A cylinder and piston, and means whereby either the cylinder or piston may be held and the other left free to serve as the moving element of the motor.

775,164. APPARATUS FOR LOADING VESSELS WITH COAL OR OTHER MATERIAL.—Charles Brown, Liverpool, England, assignor of one-third to William Harold Watson, Great Crosby, England. The combination of a barge for holding the material to be loaded; means on the barge for holding it at a given distance from and in rolling contact with the vessel which is being loaded; an elevator adapted to raise the material; chutes adapted to guide said material from the elevator; a vertically adjustable hopper designed to receive the material from the chutes; and means for feeding the elevator-buckets up to the material in the barge.

775,170. PROCESS OF REPAIRING CASTINGS OR THE LIKE.—James H. Gravell, Philadelphia, Pa., assignor of one-half to Eugene Pearson, Philadelphia, Pa. A process of repairing castings which consists in heating the part to be repaired, establishing an arc between said part and an electrode of substantially the same metal as the casting, thereby fusing a portion of the electrode and uniting it to the casting, and permitting the casting and applied metal to cool gradually.

775,177; 775,178; 775,179, and 775,180. COKE-PULLER.—James E. Jones, Switchback, W. Va. A coke-puller comprising a frame and a plurality of swinging wedge-like extractors disposed one behind another and adjustable to horizontal position to serve as coke-looseners on the instroke and to upright position to serve as coke-holders on the outstroke, and means for swinging said extractors into different positions to adapt them to perform their separate functions in succession.

775,182. MACHINE FOR DISCHARGING COKE-OVENS.—Harry King, Washington, D. C., assignor to James Ellwood Jones, Switchback, W. Va. The combination of an underworking wedge-like scraper movable over the bottom of a coke-oven and adapted on its instroke to loosen coke for withdrawal and on its outstroke to withdraw loosened coke, a swinging coke-grasper hinged to said scraper and provided with a sliding extension, and means for swinging said coke-grasper and shifting said sliding extension into operative position.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending November 5, 1904.

19,196 of 1903. MAKING METALLIC SODIUM.—T. Parker, Wolverhampton. Making metallic sodium or potassium by treating the aluminate of soda or potash with carbon, in an electric furnace.

21,316 of 1903. BINDER FOR BRIQUETTES.—G. W. Goode, H. L. Mitchell and C. G. Oakley, London. A binding material for ores, coal, etc., consisting of a solution of glucose, dextrine, resin, and an oil.

21,392 of 1903. MAKING BARIUM OXIDE.—H. Schulze, Bernburg, Germany. Improved process for making a porous barium oxide in the electric furnace.

24,472 of 1903. ELECTRIC FURNACE.—E. Ruhstrat and W. E. Grimmer, Göttinger, Germany. An improved shape of carbon poles for electric furnaces for smelting highly refractory bodies.

25,410 of 1903. MINE CAR COUPLING.—D. T. Charles, Porth. Improved shape of pin for coupling colliery cars.

15,142 of 1904. CARBORUNDUM FACING FOR BRICKS.—L. E. Muller, Paris, France. A method of manufacturing bricks with a facing of carborundum.

SPECIAL CORRESPONDENCE

San Francisco. Nov. 23.

The meeting at Marysville last week of farmers, along the Feather river between Oroville and Marysville, who think they have a grievance against the dredge miners, amounted to little, though it was largely attended. The object of calling the meeting was to take steps toward legislation which will require dredgers operating along the river to keep themselves landlocked, in order that the silt or sand thrown up from the bed shall not go on down the river and injure farming lands. Several men spoke of the damage done along the river since dredging commenced, some of the farming lands having been covered a foot or more with silt. It is conceded that no damage of this kind was done until last winter, though the dredges have been operating several years. Last winter the rainfall was exceptionally heavy, turning the mountain streams into torrents and bringing the lower rivers into flood stage. Naturally, under such circumstances, a larger quantity of silt than usual would come down, but the farmers lay all the blame on to the dredges. No general law against dredging in streams is likely to be passed. It would be hard to make a law to stop gold dredging which would not also fit dredges making levees or deepening rivers or harbors.

Meantime the dredge men are buying more and more land and building more dredges. The latest piece of land bought for the purpose is the 280 acres of the Culloo farm five miles east of Marysville on the Smartsville road. The bond price is $200 per acre and prospecting is to begin at once with Keystone drills.

The Carisa Chemical Co. of Bakersfield, Kern county, is about to utilize the soda deposits at the Carisa Plains dry salt lake, 13 miles from Olig, on the McKittrick branch railroad line. The dry lake is in the eastern portion of San Luis Obispo county, but the natural outlet of any products would be by the McKittrick branch in Kern county. The buildings, evaporating tanks, etc., are now being put up. The deposit of soda from which this company expects to get the raw material is in a dry lake six miles long by a mile wide, the deposit varying from a few inches to several feet in depth. The water underlying the lake is said to be highly charged with soda. In the winter the water runs into the lake, forming a shallow pool, but in summer this dries out and the soda crystals form a crust. The company is to use the dry material and also pump the water and evaporate it. The soda is to be hauled by traction engines to Olig and then carried to Bakersfield by train. Bailey in the 'Saline Bulletin' of the State mining bureau mentions this dry lake as covered with salt, but mentions no soda.

The great débris barrier, No. 1, across the Yuba river, nine miles east of Marysville, has been about completed. It was built by the United States government engineers with funds contributed jointly by the government and the State. The first attempt to build a dam at this point was a failure, as it went out with the freshets before completion. For this reason many lost faith in the whole plan and the engineers have been criticized rather unjustly. Brush and loose rock were experimentally used in the first dam for a foundation, but the river carried a large part of the structure away. This time piles were driven and sheathing put on and the top of the structure is covered with blocks of concrete. The large blocks weigh about 12 tons each. On the upper side of the dam rocks quarried near by are laid in place with a gentle slope and grouted with cement. This dam is 1,250 ft. in length and in flood time the water will run over it to the depth of six feet. The structure cost about $60,000. If the dam stands the winter floods another step of seven ft. will be added next year and another seven ft. the following year. The object of the dam is to hold back the débris in the river and prevent it flowing down, so as to compel the river to cut a new and deeper channel between Daguerre Point and Marysville. Another and larger dam is to be built half a mile further up the river. This débris dam was not built to permit hydraulic miners to dump débris behind it, but to hold back the débris already in the stream. All mines above the dam must still build their own impounding works and settle their débris just as if the dam was not built.

Trouble imminent among the powder companies is of interest to the miners. Suit has been commenced in the United States District Court by the E. I. Du Pont Nemours Powder Co. of New Jersey against the Peyton Chemical Co., a California corporation with works on the bay shore near Martinez. The Peyton company was organized about five years ago. but the Du Pont company is supposed to hold nine-thirteenths of the stock and two-thirds of the bonds issued. It complains, however, it has no voice in the management and asks the court to enjoin the Peyton company from levying a $10 assessment and order an accounting. All sorts of allegations of mismanagement and extravagance are charged. The Peyton people attribute the whole thing to an attempt to throttle the company on the part of the "powder trust."

The California Miners' Association holds its annual convention in this city on December 5, 6 and 7. A number of papers on technical subjects are to be read by members, and visits are to be made to points of interest about the bay. The convention will be called upon to select a president in place of C. M. Belshaw, and a secretary in place of E. H. Benjamin, both of whom decline to again accept office. Thus far no candidates of prominence have been announced, nor, for that matter, has any subject of vital importance to the mining industry yet come to the front. It is anticipated that there will be a discussion on the dredge industry, and steps taken to fight for it in case there is any fight against it. But the dredge miners have their own association, and have thus far handled matters pertaining to the industry with discretion. Possibly they do not need the aid of the Miners' Association. At all events they have not yet asked for it. As matters look now there is not much chance of anything very exciting at the convention. Elaborate arrangements have been made for the meeting, notwithstanding, but with no fight for offices and no special topic to interest the whole mining community, the meeting is apt to be rather a tame one.

CHAS. G. YALE.

Denver. Nov. 26.

The new mine wage scale in San Miguel county goes into effect December 1, and is as follows: Underground—eight-hour shifts; miners, $3; machine men, $4; trammers and shovelers, $3; men caring for horses, $3; timbermen, helpers and laborers, $3.50 to $3; nippers, $3; hoisters and engineers, $4; station tenders, $3; cage tenders, $3.50. Outside of mines—eight hours; engineers, $3.50—if hoisting men, $4; firemen, $3; blacksmiths, $3.75; helpers, $3; tool sharpeners, $3.25; laborers, $3. Tramway—eight hours; gripmen and loaders, $3; brakemen, $3.75; linemen, $4. Mill, cyanide work, etc.—eight hours; crusher men, $3; battery men, $3.50; helpers, $3; Huntington and Chile mill men, $3; concentrator men, $3.50; helpers, $3; engineers, $3; firemen, $3; blacksmiths, $3.75; carpenters, $3.75; laborers and shovelers, $3; canvas plant employees, $3; solution men, $3.50.

On November 18 the cases against 27 out of the 44 men who were arrested for complicity in the Independence depot explosion and the subsequent riots at Victor were nolled in the district court at Cripple Creek. Among the 17 cases left are those of William D. Haywood and a number of other prominent members of the Western Federation of Miners.

The long controversy as to whether the county officers have the right to assess non-producing properties came to an end on November 2, when the county treasurer began to sell a number of prospects for the taxes of last year and previous years.

The number of leased properties in the Cripple Creek district at present far outnumbers the mines worked by the owners. All the leasers on the Stratton are doing well, and many dumps are also producing satisfactorily. So far, the C. K. & N. company has paid over $100,000 to its stockholders, and is shipping about a carload of ore per day.

The Elkton Consolidated Mining Co., which has accumulated a reserve fund, since dividends were suspended about two years ago, and which has been doing well lately, will probably resume dividends before long.

Notices have been sent out by Judge Kerr, the referee in the bankruptcy proceedings of the General Metals Co., of the first meeting of the creditors, to be held on December 7, at Colorado Springs. The company is indebted to about 150 employees, whose claims will constitute a first lien on the property. The entire liabilities aggregate about $700,000.

It is reported that $17,000,000 of the $45,000,000 new bonds of the Industrial company, guaranteed by the Colorado Fuel & Iron Co., have been underwritten and the promised improvements at the great Pueblo plant will, it is hoped, soon be under way. On November 28 the bessemer steel department is expected to be running at full capacity again. The demand for rails is very heavy, especially from the Missouri Pacific system. About 30 carloads of wire and nails are being manufactured daily.

Additional incorporation papers, defining certain lines of route, have been filed at Santa Fe, New Mexico, by the incorporators of the Arizona & Colorado Railroad Co. The main line will have about 450 miles of track and its branches about 150 miles.

Backed by Chicago and New England capital, the Colorado, Wyoming & Idaho Railroad Co. has just been incorporated to construct a railroad from this city to Boise, Idaho, through the Grand Encampment and other inaccessible districts of Wyoming. Quite an amount of preliminary work has already been done.

Deadwood. Nov. 26.

Homestake shares have shown a material increase in value during the past two weeks. They are now selling at a little above $70, an advance of $10 in the fortnight. Since September, when they reached a low mark, $55, they have gained nearly one-third. The present activity in the shares is probably due to a rumor that the monthly dividends are soon to be increased from 25 to 35 cents per share. While this cannot be substantiated at the offices, it has been traced to what is believed an authentic source.

F. W. Bower, vice-president of the Reliance company, has telegraphed from the East that he has placed $200,000 worth of the company's bonds, assuring funds for the erection of a big cyanide mill at the property. For the past two years this company has been developing an extensive tract of mineral property just west of the town of Portland, on the slope of Bald mountain. Ore reserves have been created which it is believed are sufficient to supply a plant of 200 tons capacity for several years. The company has already completed a large amount of the grading for the plant, but work has not yet begun on the building.

Work now being pushed at the Eleventh Hour includes construction of cabins and a boarding house for the men. When completed the men will be put to work getting out logs. This will continue through the winter, while there is snow on the ground, and early in the spring a sawmill will be erected for manufacturing lumber and timbers for a large cyanide plant. It is hoped to have the reduction works in operation by the middle of the summer. There is a large amount of ideal cyaniding ore in sight in the Eleventh Hour workings, and it is to handle this that the plant is to be built. John Madill, of Spearfish, is superintendent.

A portion of the machinery for the Goldstake company has arrived and is being set up. The equipment, when complete, will consist of a 10-h.p. Fairbanks-Morse gasoline engine, Crocker-Wheeler generator and box electric drill, made by the Denver Engineering Works. The company's tunnel is now in the hill a distance of 500 ft., and is to be extended to 1,800 with the aid of the new machinery. In the course of the tunnel some low-grade free-milling veins have been encountered already, and it is expected that others will be found.

The Imperial mill has resumed operations after a short shut down, while additional crushing machinery was installed. The capacity of the plant has been increased from 3,000 to 4,000 tons per month. The principal ore supply at present is coming from the Costello ground, at Portland, where some large shoots of refractory silicious ore have been opened.

W. S. Elder, of Deadwood, is president of the company.

The Echo Gold Mining Co., of this city, is driving a cross-cut tunnel at its property near Maitland to open some known veins of phonolitic ore. The tunnel has been driven a little over 200 ft., and from surface indications is rapidly nearing the objective point.

The Victoria company is preparing to erect a large cyanide mill at its property at Ragged Top. The plant will probably have a capacity of 200 tons per day.

JESSE SIMMONS.

Duluth. Nov. 29.

The Stevenson mine, on the western Mesabi range, has shipped to date 1,650,000 gross tons, and is still working. It may make a few score thousand tons yet. This will put it ahead of its previous record and make it the leading shipper of the Lake Superior region for this year. When the United States Steel Corporation bought the Clairton interests there was an asset in the shape of a contract with Stevenson mine for an annual tonnage of nearly 250,000 tons for a term of years. Mr. Gayley decided that it would be well to take this tonnage faster than at the regular rate and the owners were willing, so it has been doubled for this year. This accounts, in part at least, for the gain in production over the early estimates. Stevenson was taxed this year on a basis of less than 1,000,000 tons probable production; indeed, the tax ratio on this mine every year has fallen below its output. The mine is still being stripped for the coming year and a large amount of work is to be done before next spring. Its 1905 production will be very large. The same operators have produced about 200,000 tons from their Jordan mine, Mesabi range, and some 500,000 tons at Crystal Falls, on the Menominee range, as well as a small amount elsewhere. Their production for the year is nearly 2,500,000 tons. They are now unwatering their Great Western mine and will soon prepare the Dunn for production. These two should be able to mine 300,000 tons in 1905. They are also doing development work at Jordan and elsewhere. They have the lease of Commodore mine, Mesabi range, and this property is good for perhaps 200,000 tons next year, if energetically worked.

The Monroe mine, Menominee range, is shipping a final order of 3,000 tons that must go forward before the winter. This mine is to be stripped and opened for extensive milling operations in 1905. It is one of the few Menominee range mines that have proved up well in the recent work in that region. The mine makes a grade of ore running about 40 per cent iron and very even, both in iron and phosphorus, the latter being very low. It is desirable for mixture, and is excellent in the furnace. About 100 men will be employed all winter at this mine.

The Burt mine of the Oliver company, at Hibbing, has been the most active producer of that company this year, aside from Adams-Spruce, and will close the season with about 450,000 tons to its credit. It shipped its first ore last year, and two years ago the stripping operations there were begun. It is probable that stripping may continue all winter preparing the mine for an immense output next year. This stripping runs clear back to the top of the hill north of Hibbing, and is about half a mile east and west.

The Leonard mine, at Hibbing, is closing down for the winter with shipments of 150,000 tons. It is a new mine, and did not begin stripping developments until the summer of 1903. Leonard is equipped for a very large production another year and should make not less than 500,000 tons in 1905.

The Biwabik mine, on the eastern Mesabi, has stopped shipments for the year with a production of about 545,000 tons, which is considerably less than last year and much less than the mine is looked for the coming season. It has already made sales of ore for 1905 at good figures and will be a very large producer.

Wages on the iron ore ranges are higher than for a year or so.

The Interstate Mining Co., of Jones & Laughlin's, will move off several million cubic yards of earth and other overburden from its Grant mine, Mesabi range, beginning the coming winter. The contract has been let to Hoover & Mason, contractors of Chicago, for engineering work and the like. This is the first time this firm has come into the Mesabi region and it will probably make changes in methods of work there that will be interesting, to say the least. The time-honored steam shovel has been the sole machine for moving overburden from mines of this range, except for one ill-timed, ill-planned and poorly carried out attempt in the early days of the range. Hoover & Mason bring to this work the experience of engineers of great skill in handling material, and their experiments will be watched with much interest. As was said in this correspondence some weeks ago, in reference to the probability of contracts for work at Grant mine, there are possibilities of labor saving in devices used on the Mesabi for earth removal that are inviting to engineers, and it is pleasant to note that a trial is to be made along this line. The work at Grant will be done with the aid of the clamshell, so well known in ore unloading of late years. The buckets will be suspended on cables from towers, and sections of the overburden will be lifted away, the ore below mined out, and subsequent sections of overburden dumped into the pit thus formed.

Spokane. Nov. 25.

Production of the Cœur d'Alenes silver-lead mines will be reduced this fall through the lowness of the water. The output for October is estimated at 20,000 to 21,000 tons. Of that the Bunker Hill & Sullivan shipped about 25 per cent, which is nearly its normal ratio. The four properties of the Federal Mining & Smelting Co. sent to the smelters between 6,000 and 7,000 tons of concentrate. That is a reduction due to the water shortage. The Standard and the Mammoth produced nearly half the Federal output; the Tiger-Poorman at Burke about 1,200 tons, and the Last Chance group, at Wardner, the rest. The Morning mine, which has been worst hit, yielded only 2,000 tons, or 1,500 tons less than its normal product. The Hercules and the Hecla maintained their regular monthly product of 1,200 tons.

Considerable improvement work is under way at the Bunker Hill & Sullivan mine. An addition to the ore bins is being made and several hundred feet of track have been laid, so that the cars can be loaded direct from the bins. On account of the low stage of water, the mill is partly operated by steam. The latter, however, will soon be superseded by Spokane electric power and two 50-h.p. motors are being installed. A small electric compressor has been added to the large one. The mine is in better shape than ever in its history. Large bodies of high-grade ore have been opened in the lower tunnels.

The Buckeye Mining Co., operating near Molson, Wash., in the Okanogan country, is putting in a new stamp mill. The Ben Harrison, in Chesan camp, controlled by Eastern people, has a new engine and boiler to operate its Opal mine.

H. H. Baker, manager of the Nellie S. mine, near Chewelah, Wash., reports that a drift of 80 ft. from the 100 ft. level is in continuous ore. The miners are cross-cutting for a parallel vein, which should be reached in 25 ft. The mine is equipped with boiler, engine, steam drill and pumps.

The Crown Point Mining Co., operating a molybdenum property on Lake Chelan, Wash., will continue work all winter. The Thunder Creek Mining Co., operating on the stream of the same name in the Chelan district, has just completed the installation of an electric plant, including a 4-h. p. dynamo. A Browning electric drill has been started to expose the silver ledge.

The Idaho Consolidated Co. has sold the Timber King group of five claims, about a mile from Murray, Ida., to the Golden Chest Co. for $11,000. The sale settles litigation over the property between the rival corporations. Frank Watson, of Spokane, is president of the Idaho Consolidated.

Worth Belden is suing W. T. Hales, of Wallace, Ida., for 225,000 shares of stock in the Denver & Rock Island Development Co., which is the successor to the old Duquesne Mining Co., operating near Mullan, Ida., on the Montana side of the line. Belden, who is now the most active mining litigant in Spokane, alleges that he and Hales had a partnership agreement.

Fisher & Miller, of Spokane, lessees of the Lucille Dreyfus mine near Danville, Wash., expect to ship from two to three cars of gold-silver-copper ore a week. They have eight feet of ore in the upper levels.

The property of the Portland Mining Co., one of the pioneer Cœur d'Alene promotions, will be sold by the sheriff December 5, to satisfy claims of $154,420. The Markle family, of Pennsylvania, was heavily interested in the group in early days, and advanced large sums for development. It is supposed that over $100,000 was expended on development, but no ore was ever shipped, and work was practically abandoned in 1889. The Markle interests are the creditors who have brought about the sale. The property includes the Dragon, the Mule Deer, the Silver Tip, the Sitting Bull, the Sitting Bull fraction, and the Parallel and the West Fraction.

Salt Lake City. Nov. 26.

At a meeting of the shareholders of the Nevada-Alpine Mining Co., operating at Lone mountain, Nev., the following officers were chosen for the ensuing year: M. J. O'Meara, president; Thomas J. Lynch, vice-president, and W. P. O'Meara, secretary and treasurer.

The Utah Copper Co., operating at Bingham, is preparing to sink a shaft and cross-cut to the All's Well, What Cheer and Alvina veins, an extension of which runs into the Utah Company's ground from the property of the Ohio Copper Company.

An order of court from Pioche, Nev., has dismissed the receiver appointed some time ago for the Mountain View property at Fay, Nevada.

The Mammoth mill in Tintic, after several weeks' run, has hung up its stamps indefinitely. The management does not consider further operations profitable.

The Buell ore shoot, recently encountered on the 900-ft. level of the Honerine mine at Stockton, is growing in proportions as development progresses. A cross-cut run 105 ft. fails to disclose its extent.

The Bullion-Beck & Champion Mining Co. has sought to have the verdict rendered in the case brought by the Eureka-Hill Mining Company set aside. The case was tried before a referee recently, and involved a question of trespass. The plaintiff was granted a verdict of $56,000 damages. The Bullion-Beck admits the trespass, but asks for a modified verdict on the ground that it was not done intentionally.

The case which has been pending for some time between the United States Mining Co., appellant, against Leonidas M. Lawson, respondent, et al., in the United States Court of Appeals at St. Louis, has been decided in favor of the mining company, reversing the decision of the lower court. The case is an important one and involved title to property valued at about $2,000,000. The case will be appealed to the United States Supreme Court.

Butte. Nov. 25.

The Speculator company, the stock of which is owned by John C. Creighton, of Omaha, and the Largey estate of Butte, has bought the Jesse copper-silver mine from the Lewisohn estate, paying for it $300,000 in installments. The last payment was made November 22. The Jesse is not quite a full claim. It is near the Speculator mine in the copper-silver belt north of the city. The purchaser had a lease and bond on it and has been working its vein, from 12 to 20 ft. wide, through a cross-cut from the 1,600-ft. station of the Speculator. The acquisition of the Jesse gives the company a new lease of life, for the Speculator mine is only 400 ft. square. It has yielded a large quantity of ore, its output last year being 90,352 tons, having a gross value of $8.43 per ton. The net proceeds from it amounted to $233,737.

The Parrot company has suspended work in its Parrot mine temporarily, the closing order going into effect Sunday. During the shutdown 200 ft. of the shaft will be re-timbered and other repairs made.

The Minnie Healey mine, a quarter of which is owned by F. A. Heinze and the other three-quarters is in litigation between Heinze and the Boston & Montana, was closed down November 19 on a restraining order issued by Judge Clancy, of the State Court, on an application from the Boston & Montana. The mine was being operated by the Hypocka, a subcompany of the United Copper. The Boston & Montana claimed that veins belonging to it were being mined through the Healey workings. The matter will be heard December 5.

After being closed down three months for repairs, the Gagnon mine is again in operation, having been started up the early part of the week. Ore from the mine was formerly treated in the plant of the company, but this plant is now out of commission and the ore is going to the Washoe smelter at Anaconda. Its daily output is 400 tons. W. A. Clark is also shipping 250 tons of ore from his Original to the Washoe plant. He is mining more than his own smelter, the Butte Reduction works, will handle.

The Montana Zinc Co. is making rapid progress in its work of overhauling the old 60-stamp mill of the Alice company for the purpose of treating the zinciferous ore of the Alice mine. Its rock-breakers and rolls are set and nearly all of the other machinery is ready to be placed. It will instal seven sets of electric separators and a sufficient number of cyanide tanks to treat the silicious product containing gold and silver. Before launching the enterprise the company experimented with the ore about three months, and is confident that it has solved the problem of separating the zinc, iron, lead, gold and silver which the ore contains, and saving all. It has a five years' lease on the plant and has contracted with the Alice company to supply it with ore. The daily treatment will be 250 tons. The company expects to complete its overhauling work about the middle of December. The job is under the supervision of R. K. Humphrey, inventor of the impact screen and Humphrey rolls, who had charge of the 400-ton mill built by the Guggenheim Exploration Co. in the State of Chihuahua, Mexico, and later operated a mill near Picacho, California.

Bisbee. Nov. 26.

It was reported from Jerome a few days ago, and extensively published here and East, that Messrs. James Hoatson, T. F. Cole and D. E. Woodbridge had negotiated the purchase of the Copper Chief property, some seven miles from Jerome, for the Calumet & Hecla interest, at a price of $3,000,000. Mr. Hoatson is vice-president and Mr. Cole a leading director of the Calumet & Arizona, and the two companies have always been more or less confused in popular estimation here. They did not, however, make any deal, but, on the other hand, are understood to have refused to recommend the Copper Chief property for their associates in the northeast. It was not the Calumet & Arizona which was interested in this property, but the men who were talking of it are several of those heavily interested in that mine. I am told that Calumet & Arizona is not in the market for any properties at all, as its directors feel they have enough on their hands now to develop what they have at Bisbee.

At Lake Superior & Pittsburg, the Cole shaft is now being enlarged from a small two- to a large four-compartment, and crews are working on five levels. As soon as stations are cut a crew will be cutting the shaft out at each 100 ft. of its 1,100-ft. depth. This work is in hard lime and will be slow, taking probably six months or more. When completed, and when the shaft is equipped, the mine can begin production on any scale desired. Development work underground must now all be to the south shaft, and the tram is so long, and the access so difficult, that it is not probable that much work can be carried forward while the Cole shaft is blocked.

Pittsburg & Duluth is cutting a large body of ore on the Sunnyside claim at the depth of 1,500 ft. from surface, which is far deeper than any other mine in the district has ever gone, and is an index of the persistence of these copper lenses. There is no sign of pyritic ore in this work, indicating a considerable further depth, and there is every earmark of a considerable area of ore above where it has been cut. If it proves, as is believed by some of the best mining engineers that have ever been at Bisbee, that the porphyry intrusion on the west side of the great hill on this property had as much to do with mineralization as that of Sacramento hill, on the east, the possibilities of Pittsburg & Duluth ground are hard to appreciate, and the mine will be one of the greatest in the region. Of course, any such basis for fracture and the distribution of mineral-bearing solutions would shatter the geological survey's figure of a saucer-shaped basin for the Bisbee ores, but this figure is pretty well destroyed already by developments that have been carried forward since the government's report on the district.

The ultimate production of this group of mines is hard to estimate upon any basis of calculation that does not appear roseate. There are now seven shafts, two of 1,250 ft. depth, one of 1,100, and four of 1,000. Probably another will be sunk at once. Every one of these seven, and the eighth as well, are sure to make large mines and to be able to produce ore in quantities. Irish Mag, the only shaft now producing, is hoisting 600 tons a day and is making 2,650,000 lb. copper monthly. It is not too sanguine to expect a production from the Calumet & Arizona group, in the course of two or three years, of 10,000,000 lb. a month, nor is it too much to figure that Bisbee will at that time be making, in all, 18,000,000 lb. This will rival Butte, and is equal to the whole Lake Superior region a few months ago. If there is no more change in the general Arizona situation than is now known to be pending, entirely in districts that are now producing copper largely, the territory by that time should be making not less than 325,000,000 lb. a year, general trade conditions being favorable. Prophecy is a dangerous thing, but these figures are conservative and in line with what betterments and enlargements are now under way or in serious contemplation.

Goldfield. Nov. 27.

The injunction estopping the operators of the Fuller lease on the Jumbo has been dissolved and work will be resumed at once. This does not affect the further legal entanglements in the directorate of the company. It has been reported that the Zinn and Bowes-Kernick leases have been extended to April, 1905. On the latter the shaft has reached the 250-ft. level and a station cut preparatory to extending a cross-cut to the ledge.

At a depth of 50 ft. the shaft on the Oddie lease on the Kendall has opened up a ledge of shipping ore. Assays run as high as $600 per ton. The shaft is to be continued down to the 200-ft. level in conformity to the requirements of the lease.

The face of the cross-cut at the bottom of the Black Butte shaft shows average values between $40 and $50 per ton. These values are a material increase over those secured several days ago, indicating the near approach of a big body of high-grade shipping ore. The management reports that the property is making an excellent showing.

What is believed to be an extension of the famous Jumbo ledge has been exposed by a cross-cut from the 50-ft. level of the Gold Wedge claim of the Jumbo Extension Mining Co. Six feet of ledge matter have been exposed, but, owing to the fact that filling is very considerably broken up, the shaft will be continued to the 100-ft. level before any exploitation of the orebody is attempted. The ledge matter very closely resembles that found at a similar depth on the Jumbo mine.

The shaft on the Tonopah Club claim of the Conqueror Mining Co. has been put down to 40 ft. The shoot of shipping ore that follows the hanging-wall has materially widened out in the past few days, and makes a very much stronger showing. Values continue above the $100 mark. A shipment is being sacked.

D. Mackenzie & Co., of New York, Boise, Idaho and Goldfield, have recently acquired the Watson group of mining claims, consisting of the Joshua, Hawkeye Annex and Gold Ledge. The property lies on the northwest slope of Vindicator mountain, adjoining the Bulls & Bears group on the northeast. This section of the district is looked upon very favorably by operators. Several strong ledges boldly outcrop in the group. These will be exploited under the plan of development outlined by the purchasers. A New York company will be formed to operate the property.

L. V. Lonsway has just returned from an extended prospecting trip in the Bullfrog section, some 80 miles south of Goldfield. Mr. Lonsway reports having made a remarkable gold strike in the Bear range of mountains. He brought back with him numerous samples that are very rich in gold. The discovery was made in a cross ledge, running east and west, that cuts sharply through the main mineral belt of the range. This cross ledge is reported to be four feet in width and to carry average values where opened up of $200 to $250 per ton. The ledge matter is a very heavily silicified quartz, showing black oxide of iron in quantity and stains of copper. Mr. Lonsway has executed a 15-day option on the property to representatives of Youngstown and Cleveland, Ohio capitalists, in the sum of $60,000. The report has created additional interest here in the Bullfrog county, and many prospectors and local operators are equipping for a trip to that section.

Toronto. Nov. 25.

Dr. Rutherford, professor of physics at McGill University, Montreal, has been awarded the Rumford medal for 1904 by the Royal Society of Great Britain, in recognition of his researches into radio-activity. This medal, which is regarded as one of the highest honors in scientific circles, was instituted in 1796 by the famous Count Rumford, and one is awarded every two years to the author of the most important discovery or invention in heat or light.

By the reorganization of the Ontario government, several of the former members retiring, Hon. Alex. G. Mackay becomes Commissioner of Crown Lands in place of Hon. E. J. Davis. The Bureau of Mines and the management of the mineral lands are under this department. Mr. Mackay is a new man in public life. Another new member of the administration whose views will have considerable weight in shaping its mining policy, which is likely to undergo considerable modification is Hon. W. A. Charlton, Commissioner of Public Works. Mr. Charlton is a lumberman of experience and familiar with the unsettled portion of the country. In 1897 he made an examination of the country north of the Canadian Pacific railway, and furnished a report on its timber and mineral resources, water powers, etc. The following resolution which outlines the policy of the government was moved by Hon. A. G. Mackay and unanimously adopted by the Liberal convention held here on November 23 and 24: "That the most liberal terms should be offered to prospectors for minerals, providing that the minerals are developed within a reasonable time and not held purely for speculative purposes."

C. D. Warren, of Toronto, president of the Lake Superior Corporation of Sault Ste. Marie, Ont., is in Detroit to note the progress of experiments being made in that city on a new process for smelting and refining nickel and copper ores. These experiments were begun some two years since in order to enable the company to utilize the ore from their Sudbury properties independently of the International Nickel Co. Mr. Shustedz, an expert mineralogist in the service of the corporation, accompanied Mr. Warren. The officials expressed themselves so well satisfied with the results of the test made of the process that it will be tried at the works at the Sault on a larger scale. The present plant is considered to be adequate for the purpose of reducing ore to matte so far as immediate requirements go.

G. G. S. Lindsey, general manager of the Crow's Nest Pass Coal Co., has issued a statement with regard to the recent disaster in which 14 men met deaths by suffocation with coal gas. He states that there was no explosion at No. 1 mine, Carbonado, but that what occurred was a blow-out of gas pockets. A body of pent-up gas broke through the coal at the fact of the main entry and expanded with violence through the mine, overtaking the 12 men who had started to run out. The bodies have not been recovered. The safety lamps were put out by the gas, which did not explode. Three days previous the government inspector had inspected the mine and pronounced it in first-class condition.

Sudbury. Nov. 26.

Mining matters in this vicinity are not moving very rapidly at present; very few, if any, properties seem to be changing hands. The iron deposits in the township of Hutton, which created considerable stir, do not seem to be engaging much attention. Various reasons are attributed for the apathy existing. Many of the claims are held by American capitalists, and the recent presidential election in the United States has no doubt been largely engaging their attention. Now that the snow is on the ground, no more prospecting of any account will take place till spring, though the properties now held may be more actively operated.

Mr. Hiram W. Hixon has returned from the south, and again assumes the position of manager of the Ludwig Monde Smelting Works at the Victoria mines. This plant was leased to the Canadian Copper Co., of Copper Cliff, during the construction of the latter company's new plant. Mr. Geo. H. Sprecher, who had charge of the celebrated Creighton mine at Creighton, has been made manager at the new plant at Copper Cliff, to succeed Mr. Roger Taylor.

The Elmore oil process, recently inaugurated by the Massey Station Mining Co. at Massey Station, has, so far as we can learn up to the present time, proved thoroughly satisfactory.

Operations at Webbwood are still being continued. Two companies, which recently have been formed, are prosecuting development work in the township of Shakespeare. Many beautiful samples of gold have been taken from these properties, which are less than three miles from the village of Webbwood, a divisional point on the Canadian Pacific railway.

Victoria. Nov. 16.

Nelson.—The Bayonne mine has been incorporated with a capital of $450,000, with head offices at Butte, Montana. A meeting of the local shareholders of the British Columbia Standard Mining Co. was held in Nelson last week.

Both the mines owned by the company are being operated with good results. On the ore already shipped and treated a fair profit has been made and the outlook for the future is decidedly good. Shipments from the Hunter V. have been again increased, arrangements having been made for the additional daily shipments of 35 tons to the Trail smelter. Operations at the Fern mine at Hall Siding, which has been bonded for $20,000 to two Spokane operators, are to be resumed shortly. The owners of the Wilcox mine, at Ymir, have purchased the 10-stamp mill built for the Golden Wedge mine on Six-mile creek, the machinery of which is being removed to the site on the former property. There is already at the Wilcox a small mill of four stamps. The Molly Gibson mine on Kokanee creek is again being operated, after a shut-down of nearly two years. It is expected that before long a working force of from 60 to 70 men will be employed at the property. Meanwhile new buildings have been erected and good progress is being made in the installation of a tramway, the lower terminal of which is already completed. It is stated that a good showing of zinc ore has recently been exposed at the mine.

Rossland.—Arrangements have been completed for the installation of an aerial tramway from the Jumbo mine to the Red Mountain railway, by which ore shipments from this mine will be considerably facilitated. The tramway will be nearly a mile in length and have a carrying capacity of 500 tons a day. The Canadian Smelting Works contemplate the purchase of a group of claims situated between Murphy and Rock creek, on which there is a large deposit of lime required for fluxing purposes. The concentrating mill at the Velvet-Portland is now running steadily, there being ready for shipment some 400 tons of concentrate.

Boundary.—A new and promising discovery of ore is reported to have been made in the Providence mine near the Coronation boundary. The lead, which is from 10 to 12 in. wide, has been stripped for 300 ft., and yields values of $105 in gold and silver. A contract has been let to continue the shaft in the old workings to the next level.

Monterey. Nov. 23.

The continued improvement in the production of the Dos Estrellas Mining Co., amounting to $800,000 (Mexican) in October, and $480,000 during the first ten days of November, has not only caused a marked rise in the market value of the stock—from $3,000 to $3,500 in a week—but has also increased the interest in all the stocks, and again attracted attention to El Oro district. The first effect of this is the organization of El Oro and Tialpujahua Mines Exploration Co., by a number of wealthy Mexicans in the City of Mexico. They have acquired considerable ground near the Dos Estrellas, and will shortly begin work, under the management of José J. Reynoso.

It is reported that the Guggenheim Exploration Co. has E. C. Small in the Iguala and Balsas River districts, in Guerrero, making some examinations. The Mina Grande, of the Balsas Valley Mining Co., near Coronilla, is making an excellent showing, and is said to have blocked out $1,500,000 (Mexican) worth of ore. The Gaduño Mining Co., in the Mina district, near Los Placeros, is erecting a 16-stamp mill and cyanide plant, in which it will treat the ores now being mined and the old tailing dumps, which represent the accumulations of the last 25 years.

In Chihuahua a rich copper find has been reported from Temosachic, in the Guerrero district. It is expected that Frank Collinson, of Texas, before the first of the year will have resumed operations on the Kansas Boy, in Santa Eulalia. This camp's output in October was nearly 20,000 tons, practically all of which is contracted for by the American Smelting & Refining Co. The distribution is roughly 9,000 tons from the Potosi and Santo Domingo, of the Chihuahua Mining & Milling Co., 5,000 tons from the Mina Vieja, Dolores and old Santo Domingo, 1,500 tons from the Buena Tierra, and 500 tons from the San Antonio.

From Sierra Mojada, Coahuila, the American Smelting & Refining Co. shipped during the past month from the Vulcan, Dolores, San José and Fronteriza 4,000 tons; the Mexican Metallurgical Co., from its Veta Rica and Esmeralda, 1,200; the Constancia company, 1,300 tons, and scattering, 2,000 tons, making a total of about 10,000 tons.

London. Nov. 21.

The report of Stratton's Independence, Ltd., for the year ended June 30 last, shows a loss on the year's operations of over £13,000. The output of shipping ore amounted to 43,758 tons, and the sales realized £195,738. Freight and treatment of the ore cost £70,000, and the mining expenses amounted to £140,000, while London expenses came to nearly £4,000. The amount brought forward at the beginning of the year was £133,986, out of which dividends of £75,000 were paid. Though a loss was made on the year's work, there still remains a balance on hand of £45,000. A year ago it was supposed that the large balance was kept in hand in order to enable the directors to purchase another property. From the fact that they now intend to distribute another £25,000 as dividend it may be be surmised that they have given up that project. As your readers are already aware, the mine has now been leased to tributors. Messrs. Hammond, Frecheville and others all agree that further prospecting at the deeper levels was injudicious. Great care has been bestowed on the selection of tributors, but naturally no estimate can possibly be made as to whether the company will ever derive any profits.

The prospects at the Coromandel mine in the Kolar district of India are now so promising that it is proposed to raise additional money to continue development on a large scale. With that object the company is to be reconstructed with a 5s. assessment on each share, which will produce some £30,000. This company was originally floated in 1892, being an offshoot of the Champion Reef. For a few years it was successful, but afterwards the grade of the ore fell off. The company was reconstructed in 1900, and also in 1902, so that the present is the third time that the shareholders have been asked to put up additional capital. It appears that during the past six months orebodies have been increasing in width from the 1,200-ft. level to the 1,500-ft. level, and Mr. Thomas Richard, the manager of the Nundydroog, is of the opinion, after careful examination, that development on a large scale will open up extensive bodies of payable ore.

Without considering this question from a geological standpoint, it is sufficient to say that Kolar mines have in the past merited the continued confidence of shareholders despite periods of depression and poverty, so that there will be no hesitation to provide the additional funds required at the present moment.

In addition to this reconstruction of Coromandel, the firm of John Taylor & Sons also have on hand the flotation of the Dharwar Reefs Co., Ltd. This company has been formed to acquire certain gold mines at Gadag, in the district of Dharwar, in the Bombay presidency. About two years ago the firm acquired option on properties where there were a number of old workings. Developments undertaken since then have proved the existence of orebodies that are worth working on an extensive scale.

Johannesburg. Oct. 25.

In the month of September we had 14,421 white laborers employed on the Rand, and 75,394 colored laborers, of whom about 70,000 were Kaffirs, and the balance Chinese. By July next it is expected that we shall have, in all, about 120,000 colored laborers employed, of whom about 50,000 will be Chinese; and not one white man, nor yet one Kaffir, will be turned out of employment by the advent of the yellow man. The only question at issue is the efficiency of the Chinaman; and in this connection the statistics given at the last monthly meeting of the Chamber of Mines are most reassuring. At the New Comet mine, on August 19, there were 249 coolies at work, drilling an average of 28.5 in. per man, while on October 17 there were 296 at work, drilling on an average 31 in. On the Van Ryn mine, taking similar dates, there were 314 men in August, drilling 23.5 in., while now there are 497 men, drilling 28.8 in. The Chinaman, therefore, is showing a capacity to excel in underground work which even the best Kaffirs cannot exceed, and it is all the more reassuring to learn that with the exception of two shipments of coolies from southern China, there have been as yet no cases of beri-beri. In fact, beri-beri seems to be a disease which is confined chiefly to southern China, and in a climate like that of the Rand, with regular good food and careful medical supervision, there should be very little, if any, trouble in this connection.

During the week a most important announcement has been made as to the values obtained in the bore-holes on the farm Witpoort, on the East Rand, by Messrs. Goerz & Co. These boring operations were started about November, 1897, and were carried on until immediately before the war, but no results were made public until this week. At the time at which these bore-holes were started the main reef was supposed to be either entirely cut out between Boxsburg and Benoni, or to lie about 4 miles to the north of Witpoort. So little indeed was the farm thought of that the whole of the surface rights on the western portion had been leased out on 21 years' leases, with right of purchase to small farmers, and the eastern portion of the farm was regarded as being of value merely on account of the occurrence on it of coal measures. In the five Goerz bore-holes the reef was struck in four holes, showing an average value of 18.8 dwt. over a width, when corrected for dip, of 26 in. In two of the bore-holes in which the reef was struck on the northern portion of the farm, the depths at which it was struck were 1,473 and 1,554 ft. This result, in conjunction with the results obtained from two bore-holes put down on the eastern portion since the war by the Rand Collieries, adds about seven miles to the main reef line on the East Rand and must compel statisticians to reconsider all their calculations as to the tonnage of available main reef east of Johannesburg. The available tonnage of main reef seems, in fact, to be constantly expanding, as a similar expansion of our line of main reef is being demonstrated on the West Rand by the bore-holes on the Western Rand Estates.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. John B. Farish is at San Francisco.

Mr. H. Kilburn Scott returned to England on the *Baltic*.

Mr. E. J. Schmitz is examining properties in North Carolina.

Mr. Forbes Rickard, of Denver, is examining mines in Arizona.

Mr. Alan J. Fairbairn has returned to London from Mexico.

Mr. Arthur W. Jenks, of Salt Lake City, is visiting New York.

Mr. Geo. T. Schurtleff, of Prescott, Arizona, is now in New York.

Mr. Walter de Varila has returned to Los Angeles from Mexico.

Mr. C. W. Pritchett, of Denver, has returned from a trip to Mexico.

Mr. J. W. Stearns, of Denver, is visiting New York and Pittsburg.

Mr. E. A. Weinberg has left New York on his way to San Francisco.

Mr. Edwin C. Holden leaves New York this week to inspect mines in Cuba.

Mr. Ronald E. Sawyer, recently in Egypt, is now on his way to South Africa.

Mr. J. E. Spurr, of the United States Geological Survey, is in Tonopah, Nev.

Mr. H. F. Quint has returned to Salt Lake City from a business trip to Boston.

Mr. A. B. Stewart, a Scotch mining engineer, was recently in Halifax, Nova Scotia.

Mr. Harry de C. Richards, who was recently in New York, is now at San Francisco.

Mr. William D. Munroe, of Spokane, Wash., is in the Lake Superior copper region.

Mr. Jesse Scobey is now manager of the Cienequita Copper Co., in Sonora, Mexico.

Mr. John Weir has been re-elected a director of the British Columbia Copper Company.

Mr. A. Anderson is about to become a member of the staff of El Oro Mining Co., Mexico.

Mr. J. E. Cunningham has been appointed chemist to the Peña Copper Co., at Rio Tinto, Spain.

Mr. E. F. Labadie arrived from Paris by *La Gascoigne* on his return to Golconda, Nevada.

Mr. C. C. Major has been appointed instructor in engineering at the University of Oklahoma.

Mr. E. G. Woodruff has been appointed instructor in mineralogy at the University of Oklahoma.

Mr. John A. Walker, vice-president of the Joseph Dixon Crucible Co., has returned from a trip abroad.

Mr. Herbert Haas is superintendent of reduction works for the Great Western Gold Co., at Ingot, Cal.

Mr. J. B Annear is superintendent for the Wood Mountain Mining Co., at Wall Street, Boulder county, Colorado.

Mr. J. Boyd Aarons is now superintendent of the White Feather Main Reef mine at Kanowna, West Australia.

Mr. O. H. Fairchild, of Chicago, passed through Denver a few days ago on his way to the Black Hills on professional business.

Mr. George R. Fischer is superintending the construction of the smelting plant of the United States Mining Co., near Kennett, California.

Mr. B. P. Burchard has been appointed general superintendent of the Compania Minera Monterey, at Monterey, Mexico.

Mr. George Waterlow, a well-known English financier, largely interested in British Columbia mining properties, was recently in Toronto.

Mr. W. H. O'Brien has resigned as superintendent of the H. Y. mines at Roosevelt, Idaho, to devote his time to his own properties.

Mr. E. G. Coker, of McGill University, has been elected to the chair of civil engineering at the Finsbury Institute of Technology, London.

Mr. Edwin E. Chase, mining engineer of Denver, is engaged upon an examination of the old Bassick mine, near Silver Cliff, Colorado.

Mr. E. B. Kirby, manager of the War Eagle, Center Star mines and Rossland Power Co. at Rossland, B. C., has returned from a trip East.

Mr. Chas. M. Gunn, formerly with the Union Iron Works at San Francisco, is now general manager for the Columbia Engineering Works, at Portland, Ore.

Mr. R. C. Riblet, president of the Riblet Tramway Co., has been superintending the construction of a tramway at the Consolidated Alta mines, Utah.

Mr. Manuel Diaz, Secretary of Agriculture for Cuba, has returned to Havana after visiting the agricultural and mining regions of the Mississippi valley.

Mr. T. A. Rickard has been elected a vice-president of the American Institute of Mining Engineers, to fill the vacancy caused by the death of Mr. Philip W. Moen.

Mr. Donald R. Morgan, general superintendent of mines for the Compania Metalurgica de Torreon, will make his headquarters at Sta. Barbara, in Chihuahua, Mexico.

Mr. Clarence K. Crossan has resigned as secretary and treasurer of the New Haven Iron & Steel Co., of New Haven, Conn., to engage in business in Philadelphia.

Mr. F. H. Tracy has been chosen vice-president and sales manager of the Power & Mining Machinery Co., of Cudahy, Wis., to succeed Mr. Henry C. Holthoff, who has resigned.

Mr. W. F. Hannes, assistant general manager for the Mazapil Copper Co., is superintending the installation of a Wilfley table concentrating plant in the State of Zacatecas, Mexico.

Gen. William Sooy Smith delivered the address at the ninth celebration of Founders' Day at the Thomas S. Clarkson School of Technology, at Potsdam, N. Y., on November 30.

Mr. William Shoemaker, general superintendent of construction work for the Nova Scotia Steel Co.'s blast-furnaces, North Sydney, B. C., has resigned. He will leave soon for Pennsylvania.

Mr. J. Langeloth, president of the American Metal Co., has been visiting the Boundary district, British Columbia. Mr. Langeloth has been elected president of the Granby Consolidated Copper Mining Company.

Mr. Wm. C. Ralston, of San Francisco, has been examining the mines at Tonopah and Goldfield, Nev., on behalf of the San Francisco Stock and Exchange Board, to determine which may properly be listed and called.

Mr. M. Palmer has resigned as secretary of the British Society of Mining Students. All communications should now be addressed to Mr. W. Wrench Lee, Queen's Chambers, 5 John Dalton street, Manchester, England.

Mr. Edward T. Stotesbury, a director of the Cambria Steel Co., and of the Pennsylvania Steel Co., has become senior resident partner in Philadelphia of the firms of Drexel & Co., J. P. Morgan & Co., and Morgan, Harjes & Co.

Messrs. Daniel Guggenheim, Murray Guggenheim, S. R. Guggenheim and S. W. Eccles, of the American Smelting & Refining Co., are on their annual tour of inspection of the company's properties in the West, Southwest and Mexico.

Mr. Charles Dobler, for many years in charge of the Brown Bear quartz mine, Deadwood, Trinity county, Cal., has resigned and has been appointed superintendent of the Draper mine, Jamestown, Tuolumne county. Mr. James Sutherland has been appointed superintendent of the Brown Bear.

We regret to state that Mr. F. W. Bradley was seriously injured on November 17 by a gas explosion which shattered his residence at San Francisco. His eyes were injured seriously, but not beyond recovery. According to latest advices, Mr. Bradley will be confined to his room for a week or ten days, but he is recovering satisfactorily from his injuries.

OBITUARY.

Hiram E. Hurlbut, a gold miner of '49, and a pioneer in quartz mining in Colorado, died at Denver, November 20, aged 91 years.

Judge Morris Sommer, secretary of the Steel Mining Co., died of heart failure on November 14 while inspecting the mine owned by the company at Park City, Utah.

P. Y. Murphy, formerly superintendent of the smelter of the Anaconda Copper Mining Co., at Anaconda, Mont., died at Murray, Idaho, November 20.

SOCIETIES AND TECHNICAL SCHOOLS.

American Chemical Society.—The New York section held its regular meeting at the Chemists' Club on November 11. Dr. Hugo Schweitzer introduced the following resolution, which was seconded by T. J. Parker: "The speedy introduction of the metric system of weights and measures by appropriate laws is most desirable in order to rid our country of a most illogical and cumbersome system, which is one of the greatest obstacles to the development of our export trade, and in order to place our country on a parity with other great manufacturing countries." After some discussion the resolution was adopted without dissenting vote. Papers read were: 'The Determination of Ammonia in Milk,' by H. C. Sherman and W. N. Berg, and 'Uniformity of Technical Zinc Analyses,' by G. C. Stone. This is part of the report of the committee appointed early in 1903 to classify the methods employed for the determination of zinc. This committee has found upon investigation that discrepancies in analyzing zinc ore are largely due to the application of quick methods of analysis, devised for special purposes, to ores which are unsuited for such treatment. Prof. E. H. Miller, of Columbia University, in discussing the subject, pointed out that Waring's statement that the silica should be removed before the precipitation of ferric hydroxide was entirely correct, and that the failure to observe this precaution might give rise to an error of one per cent. Waring's method for the precipitation of zinc sulphide under pressure is excellent. Prof. Miller also remarked that the statement that zinc and cadmium can not be separated by hydrogen sulphide is absolutely wrong. The separation can be effected in a hot solution (90° C.) containing 1 c.c. of concentrated H Cl in each 50 c.c. of solution. Other points made by Prof. Miller were that a three per cent uranium nitrate solution is preferable to uranium acetate as an indicator. That the precipitation of zinc as zinc ammonium phosphate is excellent. That the separation of zinc and manganese by oxidizing agents required careful investigation, and is not free from error as carried out at present. At the close of the meeting some interesting facts were elicited during the discussion on radio-activity by W. Hallock, Hugo Lieber, Charles Baskerville, Jerome Alexander and G. B. Pegram.

Michigan Engineering Society.—At the annual meeting of the board of directors of this society thre following officers were elected for the ensuing year: Dorr Skeels, Grand Rapids, president; H. K. Vedder, Michigan Agricultural College, vice-president; F. Hodgman, Climax, secretary-treasurer; A. C. Lane, Lansing; J. B. Davis, Ann Arbor; Geo. S. Pierson, Kalamazoo, directors. It was decided to hold the annual convention in Lansing, January 14, 15 and 16, 1905. A fine programme of papers is promised.

Oregon Miners' Association.—At the annual meeting the following officers were elected: Leo Friede, president and chairman of executive committee; James H. Hyde, first vice-president; W. B. Stewart, second vice-president; J. L. Diven, secretary; C. H. Thompson, treasurer; executive board, T. T. Burckhardt, Louis Zimmerman, O. M. Crouch, R. C. Wright, A. Y. Keady, Jefferson Myers, Dr. H. W. Coe, I. B. Hammond, James A. Howard, Phil. S. Bates, J. Frank Watson, F. J. Hard.

Thomas S. Clarkson School of Technology.—This institution at Potsdam, N. Y., celebrated Founders' Day on November 30.

TRADE CATALOGUES.

The Safety Cage Co., of Los Angeles, is sending out a circular describing its patent safety cage.

The National Electric Co., of Milwaukee, Wis., has issued in pamphlet form an essay on 'Commercial Alternator Design,' by W. L. Waters.

The De Laval Steam Turbine Co., of New York, devotes its handsome bulletin No. 3 to a description of the De Laval steam turbine alternators.

A unique and artistic descriptive catalogue of its steel-concrete chimneys is being sent out by the Weber Steel-Concrete Chimney Co., of Chicago.

The economy of using the Wishart gold saver and amalgamator is set forth in a pamphlet issued by the Wishart Placer-Mining Machinery Co., of Los Angeles, Cal.

The American Spiral Pipe Works, of Chicago, has prepared an attractive price list and descriptive catalogue of Taylor's spiral riveted pipe, with useful tables on hydraulics.

Ryerson's Monthly Journal and Stock List, issued by Joseph T. Ryerson & Son, of Chicago, is the usual useful compendium for manufacturers, metal workers and miners.

A smelter for small work, designed with many new ideas and improvements, is described in a booklet sent out by the Vencedora Mine Equipment Co., of San Francisco, Cal.

In bulletin 48-B the Sullivan Machinery Co., of Chicago, details the merits of the Sullivan mining machine for undercutting coal in room-and-pillar mines. There are illustrations.

Catalogue No. 55 of the Murray Iron Works Co., of Burlington, Iowa, describes its Corliss engines, and is deserving of high praise for its artistic pictures and its typographical workmanship.

Publication No. 112 of the Allis-Chalmers Co., of Milwaukee, Wis., is an illustrated catalogue of its hydraulic turbines and governors. It is prepared with the care which this company always bestows upon its publications.

The Chicago House Wrecking Co. has issued a 350-page book which contains a description of its large plant, its methods of operation and a complete catalogue of the supplies on hand at its warehouses. This company deals in nearly all the material necessities of life.

'Something Pneumatic,' the monthly magazine issued by the Chicago Pneumatic Tool Co., contains an unusually attractive variety of literature bearing on pneumatic tools, as well as much interesting matter in regard to the company's products.

INDUSTRIAL.

The Colorado Iron Works Co. has received an order for five of its improved 1904 model impact screens, from the Montana Zinc Co., in Montana.

The Barr Mining & Machinery Co., of Kansas City, Mo., invites attention to its process of separating and recovering gold by amalgamating it with mercury.

Dr. Julius Koebig and Mr. Stephen V. Childs have consolidated their chemical and metallurgical laboratories in Los Angeles, Cal., at 127 West First street, where they have the best modern facilities for making tests by amalgamation, concentration and cyanide; for making chemical analyses and assays. Their establishment takes the name of the Los Angeles Chemical and Metallurgical Laboratories.

The New England offices of the Allis-Chalmers Co. in Boston, which are now in the Board of Trade building, and the offices of its electrical department, The Bullock Electric Manufacturing Co., in the *Journal* Building, will be consolidated on December 1 and removed to the State Mutual building, 50 Congress street. Mr. George H. Berg will be the manager in charge of the consolidated offices.

The Baldwin Locomotive Works have recently received orders for 51 locomotives for the San Pedro, Los Angeles and Salt Lake City railroad, and another for 100 locomotives for the Harriman lines, the Union Pacific, the Southern Pacific, and the Oregon Short Line. The locomotives for the San Pedro road are of standard type, resembling in detail those in use on the Harriman lines, with which the road connects. The locomotives for the Harriman lines will be of standard type, much the same as those already in use on these lines.

A gold medal has been awarded to the Harrison Safety Boiler Works, Philadelphia, Pa., for their Cochrane feed water heaters and purifiers in the exhibit of the Philippine government board at the Louisiana Purchase Exposition at St. Louis. Another gold medal has been awarded for the general exhibit of the Cochrane heaters, the Sorge-Cochrane systems (for the thorough heating and purification of water for boiler feed and other purposes) and the Cochrane steam and oil separators. These were the only two gold medals awarded for feed water heaters, combined heaters and purification systems, and separators.

The Lee Paper Co., of Vicksburg, Mich., has ordered a 200-kw. Northern generator for the equipment of its new mill. This is the most recent in a long series of sales of Northern apparatus in paper mill work, the most prominent installation being the plant of the Consolidated Water Power & Paper Co., of Grand Rapids, Wis., in which are operated a quantity of Northern motors of all sizes, as well as two 300-kw. direct-current generators. The Consolidated Water Power & Paper Co.'s plant contains, among other motors, two large single voltage variable speed motors, operating from the mill power circuit and giving speed variations from 300 to 500 r.p.m., corresponding with machine speeds of 50 to 500 ft. per minute.

Among the Montana mining and milling exhibits at the St. Louis World's Fair is a model one-third the practical working size of the Pratt ore sizer. This machine is used in connection with the concentration of ores. Its object is to furnish a uniform size feed for concentrating machines. Its peculiar construction and operation enable it to handle a very large amount of ore, as the screen on this machine never blinds. The pulp or ore is fed into a distributer provided with six discharges depositing the pulp by its centrifugal force onto a perforated stationary screen. Midway in the height of the machine a diaphragm is placed, which serves to catch the unscreened material and return it to the center, emptying it into a second distributer similar to the first one mentioned. The water and fine material are discharged through the meshes of the screen and thence to the concentrating machinery, while the oversize particles are returned to the re-crushing machinery. The patentee is Fred Pratt, of Butte, Montana.

GENERAL MINING NEWS.

ARIZONA.

GRAHAM COUNTY.

Shannon Copper Co.—At the annual meeting of this company in New York the following new directors were elected: Charles F. Brooker, vice-president of the New York, New Haven & Hartford railroad and president of the American Brass & Copper Co.; A. A. Cowles, president of the Ansonia Copper Co.; Berthold Hochschild, of New York, vice-president of the American Metal Co.; Charles Hayden and Frederick L. Ames, of Boston. The new controlling interests have effected a compromise by which George C. Gill will succeed himself as president.

The annual report shows net earnings for the year ending August 31, $200,025, an increase over 1903 of $70,216. After the payment of bond interest there remains a balance of $162,235, an increase of $74,066.

CALIFORNIA.

AMADOR COUNTY.

Riverside.—In this mine at Defender, ore carrying free gold and galena has been found.

Argonaut Mining Co.—It is expected that the mill on this property at Jackson will shortly be started up again.

Bay State Mining Co.—At this property a ledge carrying ore valued at $10 per ton has been struck.

CALAVERAS COUNTY.

Clary Gold Mining Co.—This company at Indian creek, near Murphy, W. H. Clary, Jr., superintendent, will soon place a new mill on the mine.

California.—In this claim, also known as the Marshall, near San Andreas, high-grade gravel has been struck.

Hanby Mining Co.—This new company, owning property on the Mother Lode between Mokelumne hill and Fostoria, has purchased 20 stamps of the Baliol mine.

San Andreas Gold Channel Co.—This company, operating the Chris Anderson mine, near San Andreas, has started its new mill in the cemented gravel which is being mined. The force of men is to be increased.

EL DORADO COUNTY.

Oro Grano Mining Co.—This company has acquired the right to mine on the Dormody ranch, in the western part of the county, near Green valley, and is preparing to start operations. The ground is to be dredged.

Stillwagon.—This mine has been sold to a company represented by K. C. Crawford, and which is now operating the Eagle mine.

KERN COUNTY.

Yellow Aster Mining Co.—This company at Randsburg is about to add large rock-breakekrs to its milling plant.

LASSEN COUNTY.

Lassen Mining Co.—This company, which is working the old Golden Eagle and other mines at Hayden hill, with J. H. Collier as superintendent, has recently increased its force of men.

NEVADA COUNTY.

Cyane.—This quartz mine at Willow valley has been started up again, after a long idleness. The old tunnels, from which good ore was mined, are being re-opened.

PLACER COUNTY.

Azalea Mining Co.—At this property, near Blue cañon, a new pumping plant is to be installed.

Elite.—At this mine, Shady Run, after running an 1,800-ft. tunnel, and making an upraise, gravel has been struck.

SHASTA COUNTY.

Bully Hill Mining Co.—The shaft at this copper property, Winthrop, now down 878 ft., is to be continued to the 1,500-ft. level. Two furnaces are in continuous operation, most of the ore coming from the Anchor claim.

Nigger Hill.—This mine, near Keswick, is to be re-opened by J. H. Thain, of Elko, Nev., who has bonded it from W. F. Mahoney. Development work is to begin at once.

SAN BERNARDINO COUNTY.

Newberry.—Clark Bros., of Redlands, are successfully working placer ground near Newberry, and many others are prospecting in the vicinity.

SANTA BARBARA COUNTY.

Graciosa Oil Co.—This company at Santa Maria has let a contract for a nine-mile four-inch pipe line from its wells to Casmalia.

SISKIYOU COUNTY.

Gold Dike Mining Co.—The Huntington 30-ton mill and three Frue vanners have arrived at this property, Summerville, and are now being put in position. The body of ore in this mine is quite large. At the Jordan mine, Cecilville, owned by the same company, a mill is to be put up.

Medina Gold Mining Co.—This company, operating several quartz mines at Oro Fino, G. W. Addison, superintendent, is sinking a double compartment shaft on the Gardner ledge. On the Kradle claim a 500-ft. tunnel has been run. For the Johnson group a new compressor and drills have been worked.

TUOLUMNE COUNTY.

Horseshoe Bend.—At this mine foundations have been laid for a new 50-h.p. engine.

Moody.—At this mine, Big Oak Flat, owned by W. A. Nevills, 35 men are at work, and the mill has been started up.

COLORADO.

GILPIN COUNTY.

Anchor.—Leadville and local parties are interested in this property, in Willis gulch, and operations are being resumed. The property is equipped with plant and top buildings, the main shaft is down about 400 ft., and as soon as the water is out, sinking operations are to be commenced. T. S. Schlessinger, Central City, is in charge.

Barnes.—A company is being organized to operate this property, on Quartz, which is equipped with first-class plant and 700-ft. shaft, and which has been idle for a couple of years, but is credited with a production of a very fair grade of concentrating and smelting ores. B. S. Lake, of Denver, is owner.

East Nottaway.—McCullough & Co. shipped a carload lot from the 555-ft. workings, which gave values at the smelters of $358 per ton for first class, and $132 per ton for second class.

Gower Mines Syndicate, Ltd.—In cross-cutting from the 1,025-ft. point in the shaft, a new ore-shoot has been opened up, showing from 6 to 10 in. of gray copper, lead and copper-iron of the same as the best grade ores of the Running Lode mine, which carry better than $200 per ton. The production of smelting and concentrating ores is not heavy, but is of an excellent average, and the property is paying dividends every month to its British stockholders. Dr. J. H. Gower, of Denver, is president and general manager.

Star of Gilpin Mining & Promotion Co.—Illinois and Iowa parties are interested with Colorado capital in the incorporation of this company, to operate the Star of Gilpin and Paola claims, in Russell district, with W. L. Shull, of Russell Gulch, as manager. Operations are to be carried on at the Paola shaft, which is 230 ft. deep, and on which there is a first class plant of machinery. Development work along liberal lines will be carried out.

Wood.—This mine, in Leavenworth gulch, probably the first mine in the United States to produce uranium ores, received a gold medal at the World's Fair, St. Louis, for its display of uranium ores.

LAKE COUNTY—LEADVILLE.

Elva Elma.—This mine is shipping a very good grade of ore, and as work proceeds the vein becomes stronger. Several owners of ground near this claim and the Sunday state they will resume work at the beginning of the year.

Flagstaff.—This shaft is now down 350 ft. and will be sunk to a depth of 600 ft., when drifting for the Mikado orebody will be started. The Humboldt, in the same locality, is shipping about 50 tons daily of a very good grade of ore.

Hentschel.—This group, owned by the Ruby company, northeast of Red Mountain, is being worked by tunnel which will cut the vein 400 ft. from entrance, and at a depth of 2,200 ft. The ore in the vein on the surface runs 13 oz. gold and 23 per cent lead.

Lost Canon Co.—A 600-ft. tunnel has been driven and a vein of ore from six to eight feet wide opened. Assays run from $6 to $140 per ton. The property is owned by Buffalo, N. Y., parties.

Mammoth.—This placer mine in Big Evans gulch, containing 60 acres, will probably be worked by the first of the year. Drill holes sent down to a depth of 600 ft., at 500 ft. struck 17 ft. of good lead ore; then went through 48 ft. of blue lime and into 10 ft. of sulphide ore. The property is near the New Elkhorn claims.

Manhattan Mining & Milling Co.—This company is driving a tunnel into Mount Elbert to tap a rich vein that is supposed to run through that section of the hill; the tunnel is in 1,050 ft. and will be driven another 2,000 ft. The tunnel from the start has followed a vein of low-grade matter that carries sufficient values in gold to pay if a proper mill was erected at the dump to treat it.

Ruby.—The company has started a tunnel 500 ft. further down the hill, and it will be driven 1,500 ft. before the vein is cut. Work will be continued all winter. The ore in the upper tunnel averages, by smelter returns, $347 per ton.

Tuscon.—The work on a new gallows frame is completed, and the new shaft-house is being built as rapidly as possible. When this work is finished the shaft will be sunk deeper to catch the Moyer ore shoot that extends into the Tuscon.

Winnie.—During the week a good body of sulphide and oxide ore was opened in one of the lower levels, about 1,300 ft. from the shaft; the trend of the ore shoot is northeasterly. This is a distinct ore channel from the one that the company has been shipping from for some time.

TELLER COUNTY—CRIPPLE CREEK.

Cripple Creek Enterprise Gold Mining Co.—The water is being taken out of this property, presumably with the intention of resuming work. It has been idle for some time and has filled up with water. Considerable work has been done, both drifting and sinking. The company has a lease on all the ore under the streets and alleys in the larger part of the town of Cripple Creek.

Findley-Shurtloff.—The commission appointed to pass upon the difficulties of these two companies has begun its labors. It includes Messrs. Max Boehmer, E. Le Neve Foster and E. E. Chase, all of Denver. The duties of this commission consist in examining the different properties with a view to determining the amount of ore in each and the future possibilities of each property. This is being done to determine whether or not the proposed basis for consolidation is a fair one or not.

Morning Glory.—The apex suit between this mine and the Mary McKinney has been finished and the verdict given in favor of the Morning Glory. In this suit, which was tried in the United States court, the Morning Glory claimed the apex of a portion of the Mary McKinney vein. By the decision the Mary McKinney loses between three and four hundred feet of the vein. No award was made to the plaintiffs for the ore taken out by the defendants, but it is understood that this will be referred to a commission. It is understood that a new trial will be asked for. A number of the most prominent engineers of the State were engaged on the case.

IDAHO.

SHOSHONE COUNTY.

St. Louis and Ida.—These properties at Burke, in the Cœur d'Alenes, are in a high-grade carbonate. A shipment of ore from the mines will soon be made.

INDIANA.

CLAY COUNTY.

Asheville Mining Co.—This company has filed articles of incorporation with a capital of $10,000. The object of this company is to sink shafts, develop, maintain and operate coal mines in Clay county, near the town of Asheville. The principal office will be in Terre Haute. Wm. W. Ray, W. E. Burnes and W. L. Williamson, incorporators.

MONTGOMERY COUNTY.

A. L. Courtney is digging coal from his farm near Wapello. It is of very fine quality and within easy hauling distance of Waveland. R. L. Moore has opened a coal mine on the adjoining tract and the industry promises great development.

NEVADA.

LINCOLN COUNTY.

Twin Peaks.—This group, north of Moapa, has been sold by Thompson and Bullard to San Diego (Cal.) men for a reported price of $30,000.

NYE COUNTY.

Lucky Baldwin.—This mine, at Gold mountain, has become a shipping property.

Mogul.—A 2,000-ft. tunnel is to be driven at this mine, to tap the present working shaft.

WASHOE COUNTY.

Pactolus.—A 4-ft. ledge containing ore of high value is reported struck on this property, 47 miles west of Sodaville.

Searchlight.—New roads are being laid out in this district and considerable development work is reported.

NEW MEXICO.

GRANT COUNTY.

Comanche Mining & Smelting Co.—This company, at Silver City, expects to blow in its smelter by January 1.

Whitewater Copper Mining Co.—This company has begun development work on its property, in the Burro mountains.

RIO ARRIBA COUNTY.

Los Tusas Gold & Copper Co.—This company has installed a compressor at its Tampa shaft, in the Bromide district.

Red Jacket.—The shaft at this mine, at Hopewell, is being deepened to cut the surface shoots at depth.

OREGON.

BAKER COUNTY.

Alpine.—The stamp mill at this mine, at Sumpter, is working steadily on ore from the Alarm drift.

Highland.—It is reported that this property, at Sumpter, has reached a self-sustaining basis.

Morris.—This mine, in the Greenhorn district, one of the two silver mines in the State, has been sold to the Iowa-Oregon Mining Co. for a reported price between $100,000 and $160,000.

Quebec Mining Co.—A reorganization of this company has been effected, by which four Sumpter men became connected with the management.

DOUGLAS COUNTY.

Monroe City.—Gold, silver and copper ore is reported struck on this property, in the Bohemia district.

Scorpion.—A ledge of oxidized ore is reported struck on this group, in the Bohemia district.

JOSEPHINE COUNTY.

Bradshaw Mining Co.—This company is reported to be developing the Blue Ledge copper mine, in the upper Applegate district, with favorable results.

Gold Bug.—This mine, on Mount Reuben, has been secured by Portland capitalists, who are working the five-stamp mill.

MARION COUNTY.

Considerable development work is reported being carried on at the Little North fork of the Santiam river.

WALLOWA COUNTY.

Tenderfoot Mining Co.—An important strike is reported on this company's property, in the Imnaha district.

PENNSYLVANIA.

ANTHRACITE COAL.

Vinton Colliery Co.—It is reported that this company has leased mines No. 1 and 2 at Vintondale from the Lackawanna Company, and will at once begin operations.

Youghiogheny & Ohio Coal Co.—This company has purchased the mines of the A. R. Budd Coal Co. at Webster for a reported price of $250,000. The property consists of 350 acres, and has a daily output of 1,000 tons.

BITUMINOUS COAL.

H. C. Frick Coal & Coke Co.—The Monastery plant of this company at Latrobe has resumed operations after an idleness of two years. About 600 men are employed.

La Belle Coal Co.—The upper works of this company's mine, near Wellsburg, were recently partially destroyed by fire. The loss was about $8,000.

Layman Coal Co.—This company has leased the Hollenback tract at Scranton, and has begun the erection of a breaker.

Royle Coal & Coke Co.—This company has sold to H. and J. Hamilton and others its coal mines, and several hundred arces of coal land in fee and on lease at Argentine, for a reported price of $18,000.

Sackett Coke Co.—This company is building 100 coke-ovens near Smithfield, in Westmoreland county.

WASHINGTON.

FERRY COUNTY.

Ben Hur.—A carload of ore from the dump has been shipped to the Granby smelter for a test.

Manila.—A double shift is employed driving the lower tunnel to connect with the ore shoot encountered in the upper.

Minnehaha.—The shaft is down 335 ft., following the vein, which, from a contact of serpentine and diorite, the latter being in the footwall, has passed with the last 80 ft. entirely into the diorite. The vein is small, but the ore of good quality. It runs in copper and gold. The values are not reported.

Mountain Boy.—A wagon road has been constructed 1½ miles to connect with the new road between Park City camp and West Fork, which makes shipping in bulk possible, the route from the latter point being 15 miles up the Sans Poil valley to Republic, and thence by railroad to the smelters. Ore was followed 40 ft. dipping flatly, since which a drift has been driven 90 ft. on ore from a tunnel lower down the hill. A large quantity of ore lies sacked and awaiting the completion of the West Fork road for shipment to the smelter.

OKANOGAN COUNTY.

Triune.—This property was purchased three years ago by the Minnehaha Copper-Gold Mining Co., and is known as one of the oldest and best prospects in this county. It is near Golden. The group has four veins, from 2 to 8 ft. wide, of free-milling gold quartz ore, lying between granite and porphyry, and from 75 to 150 ft. apart. These veins have each been opened by shafts, the deepest being down only 60 ft. The company has a 10-stamp mill, equipped with Frue vanning tables, which has treated over $100,000 worth of ore from the group.

UTAH.

MILLARD COUNTY.

Charm.—Shipments from this property, in the Drum mining district, are to be resumed as soon as transportation facilities are arranged for.

SALT LAKE COUNTY.

Bingham Consolidated Smelter.—The copper bullion shipments during the week ending November 25 aggregated about 300,000 pounds.

United States Smelter.—Shipments of copper bullion during the week ending November 25 aggregated 257,865 pounds.

Utah Consolidated Smelter.—Copper bullion shipments for the week ending November 25 aggregated 430,100 lb. The company is now making copper at the rate of 18,000,000 lb. annually.

SUMMIT COUNTY.

New York Bonanza.—In the strike made on this property recently about 2 ft. of ore are showing. The location is in the winze sunk from the 400-ft. level. A shipment will be on the market in a few days. The ore will run about $40 net to the ton.

Ontario.—All the mine workings above the 600-ft. level have been leased.

TOOELE COUNTY.

Buckhorn.—High-grade ore shipments are to be begun shortly from this property at Ophir.

Galena King.—The faulted channel, which caused the management some anxiety recently, has been recovered and with a good body of lead carbonate.

FOREIGN MINING NEWS.

AFRICA.

RHODESIA.

The report of the Chamber of Mines gives the gold production for October at 24,919 oz. bullion, which is 1,110 oz. less than in September. For the 10 months ending October 31 the total was 213,453 oz. bullion, against 197,409 oz. in the corresponding period in 1903, an increase of 16,044 oz. The bullion reported this year was equal to 189,973 oz. fine gold, or $3,926,742 in value.

An alluvial discovery in the Victoria district is reported by the mining commissioner at Victoria. It is supposed to extend over a large area. The product seen is rough, nuggety gold, declared by experts equal to best Klondike or Australian. The supply of water on the spot now being worked is indifferent, but it can be brought in without great difficulty if results warrant. The average production is 2 dwt. rough gold to the load. The largest nugget is 9 dwt. Fine gold is also present, but cannot be recovered with present appliances. The residue is now being tested. The British South Africa Co. is sending its engineer to report on the discovery.

AUSTRALIA.

The returns for the nine months ending September 30 show that the gold-mining industry in Australasia is not in such a satisfactory condition as at the same period last year. The following are the figures:

State or Colony.	1903. Oz. fine.	1904. Oz. fine.
Western Australia	1,561,355	1,479,617
Victoria	549,577	559,339
Queensland	479,234	466,394
New Zealand	360,257	363,606
New South Wales	203,982	197,780
Total for Australasia	3,154,405	3,066,736
Decrease for 1904		87,669

The returns for the States of Tasmania and South Australia are not available, but on the basis of last year's output, they would augment the total production of Australasia by some 50,000 oz. fine.

The yield from the mines at Bendigo is being well maintained, and this field has contributed largely to the increase shown in the production of the State of Victoria. The returns obtained by the companies exploiting the deep leads have also been satisfactory. One of these companies, the Chiltern Valley, reports a profit of £18,335 on the last half year's operations, the yield of 8,413 oz. from 7,493 fathoms of wash dirt being considerably in excess of anticipations. Since its inception this company has won gold to the value of £933,000. The Great Southern Co., Rutherglen, also records a successful half year, the profits totaling £10,600. During this term 8,832 fathoms of wash dirt were treated, for a yield of 7,593 oz. gold. The well-known Ballarat field gives evidence of a marked decline. The average value of the ore crushed during the September quarter fell to 5 dwt. 21 gr. per ton, and only three companies appeared on the dividend list. In New South Wales the crushings during the last months of the past quarter were disappointing. For the eight months of the year the gold yield was ahead of the same period in 1903, but the yield for September dropped somewhat unaccountably below the average, and the term closed with a considerable shortage. Although the yield from the Charters Towers field, Queensland, is less than during the nine months of the year 1903, the results generally admit of favorable comparison. The actual excess of dividends over calls for 1904 is £238,959, as against £215,588 for the nine months of 1903. The dividends during the nine months include Queen's Cross Reef, £180,000; Brilliant St. George United, £50,400, and Brilliant Central, £50,000.

On this field (Charters Towers) a fire broke out during the month of October in one of the old and partially worked out mines, known as the Brilliant, and was unfortunately attended with the loss of seven lives. The fire is thought to have started in the engine house, at the bottom of the vertical shaft. The mines along this line of reef are all connected, and the firedamp speedily spread through them. Before a warning could be given and the men underground withdrawn, the number mentioned were suffocated. Notwithstanding that heroic efforts were made at great risk, it was found impossible to recover all the bodies, and at the date of this letter two remain in the workings. The several shafts along the line of workings were sealed down, and by the careful direction and control of the air currents, the fire was effectually confined to the Brilliant mine. After a suspension of some ten days, operations have been resumed at most of the mines, and no further difficulty is anticipated.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending November 19, were as follows, in tons: Granby, 10,700; Brooklyn-Stemwinder, 1,250; Mother Lode, 3,160; Sunset, 360; Senator, 33; Mountain Rose, 66; Athelstan-Jackpot, 240; total for week, 15,915. Total for year to date, 710,650 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending November 19 were as follows, in tons: Le Roi, 2,889; Centre Star, 1,350; Centre Star (milled), 590; War Eagle, 950; War Eagle (milled), 480; Le Roi No. 2, 480; Jumbo, 432; White Bear, 30; total for the week, 7,236; for the year, 307,403.

NEW ZEALAND.

The Mines Department reports the exports of gold for September and the nine months ending September 30 as follows, in ounces bullion:

	1903.	1904.	Changes
September	58,542	42,259 D.	16,283
Nine months	401,190	404,350 I.	3,160

The bullion reported this year was equal to 363,623 oz. fine gold, or $7,516,095. The exports of silver are reported as follows, in ounces:

	1903.	1904.	Changes.
September	67,553	77,575 I.	10,022
Nine months	569 909	712,771 I.	142,862

The greater portion of the silver has been obtained from the gold mines in the Hauraki mining district.

MINING STOCKS.

(Full quotations on pages 894 and 895.)

New York. Nov. 30.

The stock market continues active, and the rapid advance in quotations of the specialties foreshadows 'bull play' for some time to come. Professional traders are benefited by easy money, and the prospect of further improvement in general business has encouraged public investment. A healthy spot is copper, and the gradual rise in the price of the metal, owing to the greater demand, has increased the earnings of the mines and lifted most share values above last year's high record. Amalgamated did a hustling business early in the week around $78, but profit taking soon softened the price to $76.25; later there was a rally to $80.75, and on November 29 sales were reported at $81⅜. Last year's top notch was $75.625. It is noteworthy that the fluctuations in this stock so far this year have amounted to $37.875 between the high and low price, representing a total of over $58,000,000 on the shares outstanding. This is more than twice the amount of dividends paid by the company. Anaconda did not attract much attention, though it sold at $28.50@$29. Greene Consolidated, of Mexico, experienced good trading on declaration of the 4% dividend, which is the highest so far, and brings this year's total to 13% on par, $10. Sales of the stock have been made at more than three times par, and at $31.125 the record price is established. Tennessee continues in good form, showing transactions at $36@$40.125. United, Heinze's company, exchanged its common stock at $9@$10, but only in small quantity. Interest has been drawn to White Knob, because during the reorganization of the company a $3 assessment is expected. Until the indebtedness of the company has been liquidated no recovery in share values need be looked for from $1@$1.375 as now quoted. Persistent advertising of the good qualities of Montreal & Boston as an investment has elevated the price of the shares to $3⅜ on large dealings. British Columbia has improved, selling at $6.875@$7.875.

The declaration of the regular quarterly dividends on Federal Mining & Smelting shares have aided in putting up the common to $62⅜, which will yield nearly 10% per annum, and the preferred to $81.75, carrying about 8 per cent. Sales, however, are not large.

Ontario Silver, of Utah, changed hands at $3.90, and Horn Silver at $1.55.

The Comstocks received more attention from their supporters, whose hopes have been renewed by the new unwatering plan on the Brunswick lode. Hale & Norcross gained

35c., to $1.20, and other shares made slight advances

The Colorado section was quiet, and in Cripple Creek, Portland brought $1.70, and Elkton Consolidated, 67c.

Quicksilver common, of California, was slated at $2.50@$2.60, and the preferred at $5.25@$5.50.

There has been increased activity in the steel stocks, and United States Steel common has advanced to $32.75, and the preferred to $95.25—prices that show a recovery of $282,483,909 in the total issued share-capital since May last. No wonder the speculative spirit is high at this time.

There was sold at auction recently 9 shares of New Jersey Zinc Co. at $270 per share, a price which will yield nearly 5% in dividends annually, as the company is now making quarterly payments of 3% on par, $100 per share.

Boston. Nov. 30.

(From Our Special Correspondent.)

The fact that Calumet & Hecla directors did not increase the dividend beyond the $10 rate was somewhat against copper shares, but this was only temporary, however, as the stock is now selling only $10 lower than its highest, at $680, ex-dividend. United States Mining took a $2.25 spurt, touching $27.25 on the favorable decision in the Bingham camp, wherein the company gains important territory. The declaration of a $1 dividend by the Centennial-Eureka, of which the United States owns all but about 200 shares, indicates an early resumption of dividends by the United States Mining Co. This stock has been one of the most active of the local shares for some time, and shows that the pressure has been removed. In fact, the New York crowd that was responsible for the late depression have been the large buyers of late.

The almost complete change in the directory of the Shannon Copper Co. has been fairly well discounted in the market price of that stock, which has risen $1.75, to $10.75, although the closing to-night was $10.12½. At the annual meeting Monday, only three of the nine directors were re-elected. The new members include James Virdin, the Delaware representative; Charles Hayden, of the banking firm of Hayden, Stone & Co., of this city; Frederick L. Ames, of this city; Charles F. Brooker, president of the American Brass & Copper Co.; Berthold Hochschild, vice-president of the American Metal Co., and A. A. Cowles, president of the Ansonia Copper Co. The latter three will later on constitute the executive committee. It was also announced at the annual meeting that the company's offices will be removed to New York. The annual report for the year ending August 31 shows surplus earnings of $162,235, making the total surplus $250,404.

Speculation in some of the Lake Superior mines has dwindled somewhat, and so have the prices. Atlantic, which was boomed on dividend prospects, has fallen $2.25 to $17.25, and Allouez $1 to $17.50. Isle Royale, which was boomed pretty hard on prospects of the Kearsarge lode being struck, is off to $27.25. At times it was pretty hard to market the latter stock. The stock closed, however, at $28.25. Mass Mining is up $1.25 to $19.25. Utah Mining receded to $44.50 on persistent selling, while concentrated buying in Tennessee Copper caused the price to rise to $40.25. Osceola has fallen $3.50 to $94.50, but Wolverine is up to $110. Greene Consolidated showed a sharp advance of $2.25 to $30.87½ on the increase in the dividend to 24% per annum. The orders were largely from New York, as also is the market for Shannon Copper.

Colorado Springs. Nov. 25.

(From Our Special Correspondent.)

Cripple Creek shares have been in quite good demand on the local exchange during the past week. During the fore part of the week prices of practically all on the mines list advanced, but in some instances dropped off again before the close of the week.

C., K. & N. has declared its twelfth dividend for the year, making a total of 12c. per share, with the stock selling at about 20c.; three years ago it was selling for less than 1c. per share. Elkton, which has been off the dividend list for a long time, is reported to be ready to declare a December dividend of 1c. per share. Cripple Creek Consolidated advanced from 11 to 12½, but dropped off again, with quotation to-day about the same as one week ago. Elkton has advanced from 67 to 69; El Paso from $1.13½ to $1.16; Isabella from 19¼ to 20½c. Portland is selling at $1.70 per share.

Salt Lake City. Nov. 26.

(From Our Special Correspondent.)

The past week was a busy one on the floor of the exchange, and, generally speaking, the market was in good tone. Considerable trading was done in Daly, on the strength of a strike made in the Federal tunnel. Beck Tunnel Consolidated sold up to 11¼c., while Butler-Liberal, of Bingham, remained stationary. Daly-Judge continued practically unchanged, while Daly-West hangs around $13. May Day and New York Bonanza were both active, but ended the week lower. Victoria, of Tintic, was in favor and made some advances. Silver Shield, of Bingham, was traded in to the extent of 22,000 shares. Wabash has a short account, and, being closely held, the stock stiffened, ending the week slightly lower.

San Francisco. Nov. 24.

(From Our Special Correspondent.)

Business has been active for a week broken by a holiday, and sales of stock have been quite large. Trading in the Tonopah shares on the old exchange is increasing.

In the Comstocks the following quotations are noted: Ophir, $2.15; Consolidated California & Virginia, $1.80@$1.85; Mexican, $1.15; Hale & Norcross, 88c.; Savage, 27c.; Yellow Jacket, 18c. per share.

On the San Francisco & Tonopah exchange business was very active, and values generally well sustained. Montana Tonopah brought $1.75; Tonopah Belmont, 70c.; Tonopah Midway, 36c.; Diamondfield, 25c. The heaviest dealing was in Tonopah Midway.

On the California exchange the market for oil stocks has been rather dull, and sales comparatively small. Independence brought 33c.; Junction, 15c. The other shares were largely neglected.

Monterey. Nov. 23.

(From Our Special Correspondent.)

As a result of the proposed monetary reform, exchange on New York dropped during the week from 215 to 208.

Interest in Dos Estrellas stock has affected the market, creating more activity. Dos Estrellas brought $3,350; Victoria, $42; Aldebaran, $80; Rosario, $32; Reforma, $10; Buen Despacho, $75, and Union, $12. In San Luis Potosi, Guadalupana brought $20; La Paz, $252; Barreno, $89. In Pachuca, Amistad, $78; Sorpresa, $345; San Rafael, $805; San Francisco, $80. In Guanajuato, Augustias, $420; Cinco Señores, $30; Providencia, $160, and Santa Maria de Guadalupe of Zacatecas, $105.

COAL TRADE REVIEW.

NEW YORK, Nov. 30.

ANTHRACITE.

The anthracite market, so far as local trade is concerned, continues to be mainly a weather market. The cold snap which followed Thanksgiving day stimulated buying to some extent, but to-day shows a return to milder conditions, which will probably be followed by another period of comparative quiet. The consumer has, apparently, forgotten the strike winter, and, secure in the belief that he can get coal whenever he wants it, is inclined to put off his purchases as long as possible. Naturally, this condition is reflected in the wholesale trade, as city yards do not care to carry more stock than they are obliged to, and they also have a feeling of security that they can get coal when they want it. Nevertheless, demand is very fair, and the production is well kept up. It seems quite probable that November shipments will run well up towards 5,000,000 tons, and that the total for the year will not fall very far behind the extraordinary figures of 1903.

Coastwise trade is quiet, except that there is some pressure to get coal into the eastern shoal-water ports before ice makes. The season has been so mild, however, that most of these ports are pretty well supplied for the winter. Transportation conditions are fair on tidewater coal, but there is still a shortage of cars for western shipments. In Chicago territory conditions are about the same as last week, although buying for domestic use has been stimulated a little by colder weather.

The demand for steam sizes is improving somewhat, and may now be considered good. Prices, both for domestic and prepared for steam sizes, are unchanged.

The Interstate Commerce Commission is now holding its final session on the complaints against the anthracite roads made by W. R. Hearst. The session began Monday, and the testimony up to date has been confined chiefly to evidence as to the cost of hauling coal on the Erie and other roads and to the submission of statements as to shipments over the various lines. Some evidence has also been taken as to the increase in prices of anthracite, since the settlement of the strike. The hearing will probably last most of the week.

BITUMINOUS.

The Atlantic seaboard soft coal trade is in a very strong position. Demand is such as to affect all classes of coal, and in fact, the specialties are experiencing some difficulty in keeping up with their orders. The cold snap has intensified the demand from shoal-water ports, and the urgent request of consumers for additional prompt shipments has compelled certain sellers to curtail their tidewater deliveries.

In the far East demand is good, though shippers show precedence to ice-making ports, anticipating an early closing up in the territory this side of the Cape. Along the Sound there has been quite an improvement in business, and sellers are concentrating their efforts here before ice locks the harbors. At New York harbor an increased trade is being done, and prices for the Clearfield grades of coal have advanced 5 to 10c. per ton, to $2.50@$2.60.

More activity prevails in the all-rail trade; indeed, producers are holding back some orders to give tidewater shipments a fairer proportion. Transportation from mines to tide is variable, some roads rendering good service, others bad. The car supply has not changed for the better, some roads meeting about 25 per cent of the demand, and others 75 to 80 per cent.

In the coastwise market vessels are not in plentiful supply. From Philadelphia, rates on large craft are 70c. to Boston, Salem and Portland; 60c. to the Sound; 75c. to Lynn and Bath; 80c. to Newburyport; 75c. to Portsmouth.

Birmingham. Nov. 28.

(From Our Special Correspondent.)

Alabama's coal production is much better now than it was a month ago, especially at the mines where the union miners and mine workers are out on strike, non-union men being imported into the district to do the work. The Blocton mines in Bibb county, of the Tennessee Coal, Iron & Railroad Co., are now producing more coal than at any time in four months. More than 125 experienced coal miners from West Virginia were brought into the district during the past week, and given employment in these mines. There is a strong demand for the Blocton coal, inasmuch as it is the best in this district for export purposes. The Tennessee Co. also placed a number of the imported men this week in their mines in the Pratt Mines division. The Sloss-Sheffield Steel & Iron Co., the Lacey-Buek Iron Co., the Woodward Iron Co., the Tutweiler Coal, Iron & Railroad Co., and the Republic Iron &

The pig iron market is still showing strength. their coal mines, all report a steady increase in their coal outputs. The leaders of the union miners reiterate their statement that they are still able to hold out in the struggle and have considerable funds on hand. There is much Alabama coal being shipped throughout the South. The Mexican railroad contract is causing considerable effort to be made in filling it in quantities desired. The railroads are requiring a large amount of fuel as their business begins to pick up.

The Southern Railway is assisting in the development of the coalfields in Walker county. Several extensions of track will be built, while considerable side track is also under consideration.

Chicago. Nov. 28.

(From Our Special Correspondent.)

The coal market continues very unsatisfactory to dealers, both in anthracite and in bituminous. There has been practically no cold weather yet over Chicago territory to stimulate sales into normal winter activity, and so the trade is in a waiting condition. Nothing, apparently, but the stress of immediate need will make consumers of anthracite buy more coal than will suffice for current needs, and retailers, under such circumstances, do not buy liberally. The cold wave of last Saturday has made a perceptible increase of business in anthracite to-day, but it will be of brief duration probably.

Bituminous is practically featureless, the market being flat and without strength anywhere, unless it is in domestic sizes, demand for which is better than for anything else.

Western steam coals especially have been hard to move. Of eastern coals, smokeless continues in comparatively good demand, but with the supply hampered somewhat by the railroads. The indications are for another week of dulness in bituminous, both eastern and western.

Cleveland. Nov. 29.

(From Our Special Correspondent.)

The interest in the fuel trade has centered in the market for coke. The supply seems to be getting steadily shorter, through the lessening of the supply of equipment and the steady drain upon the ovens for material. One of the best-known makers made the announcement to-day that the price would in future be $2.75 at the oven for good 72-hour furnace coke. Others are not so comfortably situated, and prices range from $2.50 to $2.75, with the generality of sales at about $2.60 at the oven. There is also a firmer demand for furnace coke, which also seems to be getting shorter, and the market quotation on that material ranges about $2.15@$2.25 at the oven. There is a good, steady demand all along the line, and the market is strong. There has been an advance in domestic coal also. The Massilon operators, at a meeting last week, announced an advance of 25c. a ton at mines on all of their coals. The usual winter advance is 50c. a ton. The dealers have protested against this advance, which is to go into effect December 1. Unless the producers rescind their action, the dealers will also advance the price. The base quotation on this coal is $2.55 for general lump, f. o. b. the mines. There has been a better demand for steam coal also, and the fact that the supply of slack will soon run short has put prices up a little. Steam coal is now selling about $1.20@$1.25 at mines for both Ohio and Pennsylvania coal, while slack is bringing 40@45c. at the mines, and a prospect of an advance as soon as the lake season is ended. There is very little if any change in the lake situation, which remains firm to the end. The movement for this year is almost over.

Pittsburg. Nov. 29.

(From Our Special Correspondent.)

Coal.—The mines in the Pittsburg district are operating more steadily, as railroad cars are not as scarce as a week or two ago. The demand continues good, and contracts are being made for deliveries next year. It is reported that the Pittsburg Coal Co. has entered into contracts with a number of independent operators for their entire output, and is strengthening its position in order to hold its big lake trade. Other interests also are buying, and the competition for the trade in the northwestern markets promises to be keen. Prices remain about the same, run-of-mine being quoted at $1.05@$1.15 a ton at the mine. A rise in the rivers is expected soon, when about 20,000 bushels of coal will be shipped to the lower markets. No coal shipments have been made by river since July 12.

Connellsville Coke.—The H. C. Frick Coke Co. has started about 2,000 idle ovens during the week, and the rest will be put in operation when there is a sufficient supply of water. The demand is strong, and prices are very firm. Present quotations are $2.10@$2.25 a ton for furnace, and $2.25@$2.50 for foundry coke. It is believed that $2.25 will be the minimum price for furnace coke in the first quarter. The production last week was 195,132 tons, and the shipments 9,322 cars, distributed as follows: To Pittsburg and river points, 3,504 cars; to points west of Pittsburg, 4,680 cars; to points east of Everson, 1,138 cars.

San Francisco. Nov. 24.

(From Our Special Correspondent.)

The market continues quiet, with supplies sufficient for all demands. There has been no change in prices. Fuel oil is a little lower, and the demand continues good.

For Pacific Coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $14. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14 and Cumberland $13. For English coal, quotations are ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade. Nov. 30.

More business is being done to the West Indies; otherwise export trade is quiet.

Imports of fuel into France for the nine months ending September 30 were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	8,234,360	7,993,590 D.	240,770
Coke	1,097,840	1,223,520 I.	125,680
Briquettes	460,560	402,220 D.	58,340
Total	9,792,760	9,619,330 D.	173,430

About 53% of the coal imported this year came from Great Britain, 35% from Belgium and 8.5% from Germany. Of the coke, 66.8% was from Germany and 32.2% from Belgium, only 1% being from other countries.

Exports of fuel from France for the nine months ending September 30 were as follows, in metric tons:

	1903.	1904	Changes.
Coal	703,070	816,160 I.	113,090
Coke	67,710	98,860 I.	31,150
Briquettes	57,910	52,630 D.	5,280
Total	828,690	967,650 I.	138,960

The chief exports were to Belgium and Switzerland. The figures include coal furnished to steamships for foreign voyages.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of November 19 that there is very little demand for all qualities of coal, and prices remain unchanged, as follows: Best Welsh steam coal, $3.54; seconds, $3.36; thirds, $3.12; dry coals, $3.18; best Monmouthshire, $3.06; seconds, $3; best small steam coal, $1.98; seconds, $1.80; other sorts, $1.68.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

In the freight market, Mediterranean prices are a shade easier; other directions unchanged. Some rates quoted from Cardiff are: Marseilles, $1.45; Genoa, $1.38; Naples, $1.26; Las Palmas, $1.38; St. Vincent, $1.50; Rio, $2.04; Santos, $2.52; Buenos Aires, $1.68.

IRON TRADE REVIEW.

NEW YORK, Nov. 30.

The iron markets continue to show activity in almost all lines. In pig iron, buying continues very good, and most furnaces claim to be sold up for the first quarter of 1005, so that current negotiations are largely for second quarter deliveries. Prices show a slight advance, and it is even reported that premiums have been paid on some orders where early deliveries are needed. More furnaces are going into blast, and it looks as if the idle capacity at the close of the year would be very small.

Steel billets are also advancing, and early deliveries are difficult to get. Nothing is being done at any figure below the pool price, and it is thought that that quotation will be advanced shortly.

In finished material, indications are for an active business through the winter, and very probably for a general advance in prices. Bars and similar material are being taken by the car builders and other manufacturers in large quantities, and the bar iron mills find some difficulty in filling their contracts. Plates and other like material are also in good demand, and structural steel, which has been the most backward section of the market, is improving under orders for bridge work. Upon the whole, the market is in very good shape.

There has been some tendency towards speculative purchases of pig iron, but furnaces are generally inclined to check this, and to hold back on orders for delivery too far ahead.

Birmingham. Nov. 28.

(From Our Special Correspondent.)

The pig iron market is still showing strength and two companies are out of the market almost completely for delivery before April 1, 1905. The production shows no changes in the past week, while the demand is strong and orders on hand are taking up the product as fast as it is being manufactured. No. 2 foundry iron is being held firmly at $13.50 per ton, delivery during the first half of the coming year. More than one of the Alabama furnace companies announce already that 50% of the possible make for the first three months of the year has been sold. The Sloss-Sheffield Steel & Iron Co. sold during November approximately 50,000 tons of pig iron, delivery in the next five or six months. The surplus stock of iron belonging to this company has been worked down considerably and the statement is made that the entire accumulation of iron in this district is now less than 35,000 tons, against 120,000 tons a few months ago. The Tennessee Coal, Iron & Railroad Co. has seven furnaces in operation, five at Ensley and two at Bessemer. The furnaces at Ensley are manufacturing basic iron for the steel plant and one of the Bessemer furnaces is also making this class of iron. The Sloss-Sheffield Co. still has six furnaces making iron. The other companies report no change in production. The supplies of raw material in Alabama are maintained, as the weather for outdoor work continues good. The supplies in the way of coal and coke are somewhat improved, as the places of striking union miners are being filled with non-union men brought into the district from Tennessee, Kentucky and West Virginia. The strike it still on.

The following quotations are given here: No. 1 foundry, $14; No. 2 foundry, $13.50; No. 3 foundry, $12.50@$13; No. 4 foundry, $12@$12.50; gray forge, $11@$11.50; No. 1 soft, $14; No. 2 soft, $13.50.

The cast iron pipe trade in the Birmingham district shows no change, the plants being busy and production heavy. The steel industry in the district is also quite active with the steel plants at Ensley and Gadsden doing well. The four rolling mills in operation in Alabama are doing well. The foundries and machine shops in this district announce that their trade is steady.

Chicago. Nov. 28.

(From Our Special Correspondent.)

Sales of pig iron have been numerous in the last week, and the aggregate volume, though not so large as the corresponding total for the previous week, shows continued heavy business. The largest sale of the week was 2,000 tons of southern. There is no weakening of the market as regards prices; indeed, on general business southern is 50c. higher than the prices quoted last week, or now $13.50@$14, Birmingham, which means $17.15@$17.65, Chicago. Northern is quoted at $16@$16.50. The business is now for deliveries in the second quarter of 1905, on northern, and for both the first and second quarters on southern. Naturally, southern is gaining in volume of sales, with a good business yet to be done in supplying local consumers with iron for the first

quarter, and northern furnaces sold out for that quarter.

Finished products have also sold well, a disposition being shown to contract as far ahead as possible as regards steel products. This market, like that for pig iron, is very strong, with all indications pointing toward continued firmness.

Cleveland. Nov. 29.

(*From Our Special Correspondent.*)

Iron Ore.—The market is about at an end for this year. No sales are now possible, if delivery is expected before the end of the season of navigation, and consequently the interest in the amount which is to be brought down the lakes. A record for November is expected. There is some talk of ore sales for next year, but producers are refusing to make contracts, as they believe that the market will be influenced again next year by the renewal of the dissolved Ore Association. Rates of carriage have not been changed.

Pig Iron.—Under another spurt of buying, foundry iron has again advanced, and now the general quotation is $16 at furnace, with most of those outside of the Valleys withdrawn from the market. The quotation, therefore, is virtually $16 in the Valleys. Some sales have been made at $15.50 during the past week in the Valleys for first quarter delivery, and in some few instances as low as $15 has been paid. The iron at that price is scarce. The southern furnaces are still off the market. Most furnaces here are refusing now to sell for second quarter, although a few are making first half contracts on No. 2 at $15.50 in the Valleys. The amount of material remaining to be sold for first quarter delivery is very small, and the iron on hand for spot shipment is limited. A number of furnaces are off the market entirely for these deliveries. There is very little being done in bessemer or basic, and prices quoted are nominal. There are a few quotations as high as $16, but for the most part both irons are quoted about $15.50 in the Valleys. There is a steady demand for malleable at $15@$15.50.

Finished Material.—The price of bar iron has been advanced to 1.50@1.55c., Youngstown, and the mills profess not to be anxious to sell at that price. The good demand which has been the cause of other advances was not potent here, but rather the higher price for scrap caused the rise. The scrap dealers have been steadily advancing prices, and have now reached a point where the mills make the statement that they are ruinous. Further advances being in sight, the mills say that they will be forced to put bar iron prices even higher. Meanwhile bar steel is selling at 1.30c., Pittsburg, and some of the consumers have switched from bar iron to that product. The mills are not anxious to sell it, and some are limiting contracts to January 1. Others are taking care of old customers through the first half. Those who are limiting delivery expect an advance, and a rise of $2 a ton would not be surprising. New tonnage in shapes and plates is not very liberal, but one of the hopeful signs is that all of the buyers on contract are now specifying heavily, and have taken out already more than is called for by their contracts. There has been good specifying by the traction lines on their contracts for rails. There is no new tonnage on the market at the present time. Buying of light rails continues to be good, at prices ranging a little above the association list. The higher prices for sheets did not stop the buying movement. The base price is 2.40c., out of stock, for Nos. 22-24 black sheets, and 2.10c. at the mill for one pass cold rolled, by car lots.

New York. Nov. 30.

Pig Iron.—The market is somewhat quieter this week, buying for near-by deliveries having ceased for the moment.There is still a good deal of negotiation over futures, and prices are, if anything, a little higher. We quote for Northern iron as follows: No. 1 foundry, $17@$17.50; No. 2 X, $16.50@$16.75; No. 2 plain, $16@$16.25; gray forge, $14.75@$15.25. Virginia basic sells around $16.50. Southern iron on dock is quoted as follows: No. 1 foundry, $17.25@$17.75; No. 2, $16.75@$17.25; No. 3, $16@$16.50; No. 4, $15.50@$16; No. 1 soft, $17@$17.25; No. 2 soft, $16.75@$17 ; gray forge, $15.25@$15.50.

Dealing in warrants on the Produce Exchange has been on a moderate scale. No business has been done in spot or December delivery. Latest quotations are as follows, the first figure giving the bid, the second, the asked price: January, February and March, $17.25—$17.50; April, May and June, $17.30—$17.55.

Bars.—The market is firm. Quotations are 1.545, carload lots, Jersey City delivery. Soft steel bars are the same as for iron. Store trade is good, and prices are steady, at 1.70@1.75, immediate delivery.

Plates.—Buying continues very fair, especially in small lots. We quote for tank plates, ¼ in., 1.545, in large lots, tidewater delivery. Flange and boiler plates are 1.645, same delivery.

Structural Material.—Business is still mainly in small lots. Quotations have been steady at 1.55@1.65 for beams, angles and channels.

Steel Rails.—There is no change in quotations for standard sections, $28 per ton at mill still being the regular price. Very little business is doing here. Light rails are active, and prices continue at $21 per ton for 40-lb. rails at mill, and $24 for 16-lb. rails.

Scrap.—Old material is higher, under pressure of an active demand. Machinery cast brings $13@$13.50 per ton. No. 1 wrought has sold up to $17 and $18. Heavy steel melting scrap brings $14.50@$15. These prices are all on cars, Jersey City or other terminal deliveries. Material delivered to foundry brings about $1.50 more.

Philadelphia. Nov. 29.

(*From Our Special Correspondent.*)

Pig Iron.—The pig iron market is in such an unsettled condition that it is impossible to give reliable quotations. Some makers, having already sold as much iron as they care to, are quoting higher figures than they would probably name if they had iron to sell. Besides that, there is a feeling among our pig iron makers that they want to discourage any speculative movement in pig iron for their own future good, and they are quoting prices higher for late delivery than for early. Very heavy transactions have been closed within the past few days for all kinds of iron, notably foundry. Some of our furnace people have practically withdrawn from the market, although they have unsold capacity for the first quarter of next year. The market has a very strong tone and prices are more likely to move upward than stand still. In the opinion of some of our furnace people the market has quieted down within two or three days, while others say the daily inquiries received indicate a very disturbed condition and a strong disposition to buy for delivery after January 1. A few of our larger consumers have made arrangements for Virginia and Alabama irons and to-day two or three negotiations are under way which point to very large midwinter shipment from those quarters to eastern Pennsylvania. Quotations may be given tentatively as follows: No. 1X foundry $17@$17.50; No. 2X foundry $17; No. 2 plain, $16@$16.50; forge, $15.50@$16; basic, $15@$15.50; low phosphorus, $20.

Billets.—Quotations were wired to-day at $24.50, and mills, it is reported, are so well sold up that for early deliveries an advance of 50c. is announced over the quotations named two weeks ago.

Merchant Bar.—Another advance has been practically made in retail circles, from stores, which amounts to $2 per ton, and the demand is quite active. Orders are being sent to mills for steel bars in which 1.43½ is the minimum price in large lots, with small lots selling at an advance.

Sheets.—The sheet iron people make a very booming report to-day concerning the demand for forward delivery.

Pipes and Tubes.—Railroad requirements have stimulated this branch of the trade, and requirements from other sources have given the market an upward tendency.

Merchant Steel.—A number of users have precipitately sent orders to mills under an impression that all kinds of merchant steel are shortly to be marked up.

Plates.—The plate industry is in a very healthy condition and since last week two or three very large contracts have been placed. In addition to this our boiler shops all through eastern Pennsylvania are being heard from. Quotations remain where they have been for some time, but an advance seems imminent.

Structural Material.—The determination of two or three large railway systems to hustle railroad bridge construction this winter accounts for the placing of some unexpected business for shapes. Beams, channels and angles are 1.53½@1.65.

Steel Rails.—There seems to be still a lingering hope that quotations will be modified, even after some positive announcements to the contrary. Light sections are selling quite freely, and the contract prices for orders placed range all the way from $22 to as high as $26.

Scrap.—Old iron rails are creeping up toward $20, and are not to be had, excepting as a favor. All kinds of scrap have advanced in price, the average being about 50 cents, but there is a shortage of supply even at that, especially for railroad scrap, which is all spoken for in advance at $18.50, and also of No. 1 steel scrap, for which $16 is offered without finding any dealers who are able to furnish supplies for immediate delivery.

Pittsburg. Nov. 29.

(*From Our Special Correspondent.*)

The iron and steel trade is moving along very satisfactorily, and although the volume of business is not particularly heavy, prices in all lines are much firmer. Pig iron prices are higher this week, and as most of the active furnaces are sold up for the rest of the year, it is almost impossible to obtain any iron for prompt shipment. A sale of 25 tons of foundry No. 2 was made to-day at $16, Valley furnace, the highest point reached. The largest contract for pig iron has just been closed by the Westinghouse Electric & Manufacturing Co. It calls for 10,000 tons of foundry No. 2, for delivery in December and the first three months of next year. Of this tonnage, 7,000 tons was placed with Valley furnaces, at $15 and $15.25, at the furnace, or $15.85 and $16.10, Pittsburg; 2,500 tons with West Virginia furnaces, at $14, at the furnace, or $16.55, Pittsburg, and 500 tons of southern iron, at $13, Birmingham, or $17.35, Pittsburg. There are a number of inquiries in the market, and it is doubtful if these prices can be duplicated. The United States Steel Corporation is rapidly getting its idle furnaces in operation. The Carnegie Steel Co. has just put in blast the rebuilt No. 2 furnace at New Castle and the No. 3 furnace at Sharon, never before operated. The Carnegie Co. has but five idle furnaces, one of the Isabella furnaces at Etna, one at Columbus, two at Donora and one at Clairton, the three last named having never been operated. Indications point to an early start at all of these furnaces. The Steel Corporation, according to the latest reports, is operating fully 90 per cent of its pig iron capacity. Edith and Neville Island furnaces of the American Steel & Wire Co. are idle, but they are closed for special reasons. There has been a surprising ore movement, and the predictions of a shortage of at least 4,000,000 tons compared with the shipments of last season will not be realized. Some merchant furnaces that had expected to remain idle during the winter may be put in blast within the next month or two. W. P. Snyder & Co. have just bought Mabel furnace, at Sharpsville, from the Perkins Iron Co., but it is not yet known when they will take possession. The Snyder interests now own four furnaces at Sharpsville, of which only one is running. The other three likely will be started next month or early in January.

There is a remarkable improvement in finished lines, particularly in sheets and tin-plate, the demand being greater than in any previous year. The American Sheet & Tin-Plate Co. has issued orders for a resumption at all of its idle plants, and they will be started as fast as steel can be delivered. It has 242 tin-plate mills and 164 sheet mills. To-day about 185 of the tin-plate mills are running, and from 75 to 80 per cent of the sheet mills are in operation. It is understood the company has booked some heavy orders during the

week, but official information on this subject cannot be obtained. J. A. Topping, the president, and E. W. Pargny, general sales-agent of the company, were in Chicago one day last week. The object of the trip was not made public, but it is rumored that they closed with the big packing interests some large tin-plate contracts. The American Can Co. also is said to have been a large buyer. The independent tin-plate mills have been running steadily, but are not selling ahead, owing to difficulty in buying steel. The price is firm, at $3.45 a box for 100-lb. cokes, f. o. b. Pittsburg, and it is possible to get premiums for extended deliveries. The demand for wire products and merchant pipe continues heavy. Wire is selling for 60 days ahead only. It is believed another advance will be ordered. There is talk of an advance in structural steel, and it seems certain that steel bars are to be advanced. During the week the Republic Iron & Steel Co. announced an advance of $3 a ton on iron bars, faking the new price 1.55c., Youngstown. It also announced that this price is only for immediate delivery. This is regarded as strange, from the fact that the average of sales for September and October was between 1.20 and 1.30c. Bessemer steel bars are still quoted at 1.30c., the pool price, although the Cambria Steel Co. has advanced its price to 1.40c. An advance, however, is expected to be ordered by the steel bar pool in a short time. It was rumored during the week that the differences over allotments in the steel rail pool had been adjusted, but no confirmation was obtained. According to the report, the Lackawanna Steel Co. insisted upon an allotment of 17.5 per cent, but compromised on 15 per cent. The company is said to have an annual capacity of 600,000 tons of steel rails, which is 20 per cent of the estimated consumption for 1905. While no definite information can be obtained, it is believed here that the pool will meet in a few days and make a satisfactory settlement and continue the price for another year at $28.

Pig Iron.—Sales of pig iron during the week have been fairly good. In addition to the 10,000 tons of foundry No. 2 contracted for by the Westinghouse Electric & Manufacturing Co., a number of small lots have been sold. Prices are as follows: Bessemer, $14.75@$15.50, Valley furnaces; foundry No. 2, $15.85@$16.85, Pittsburg; gray forge, $15.35 @$16.35, Pittsburg.

Steel.—Sales of billets have not been large, as mills refuse to sell for extended future delivery. The pool price of $21 for bessemer and open-hearth billets cannot be shaded, and sheet bars are firm, at $23. The plate market is very strong, due partly to increased orders for steel cars. The Pressed Steel Car Co. yesterday put its big plant on double turn, and its employees were assured of steady work for several months. Plates are still quoted at 1.30@1.40c., but an advance may be expected at any time. Bessemer steel bars are quoted at 1.30@1.40c., and open-hearth bars at 1.35@ 1.45c. These prices are likely to be advanced.

Sheets.—The sheet market continues strong, and the new prices are strictly adhered to. Black sheets, No. 28 gauge, are firm, at 2.20c., and galvanized at 3.25c.

Ferro-manganese.—The market for 80% domestic continues at $41.50@$42.50.

Cartagena, Spain. Nov. 12.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Exports for the week were one cargo, 1,450 tons dry ore, to Great Britain. Conditions in the local market are improving. The advance in prices has been very slight, but there is more confidence in the future, and inquiries are frequent.

Quotations for iron ores are as follows: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorus, 6s. 6d.@7s. 3d.; specular ore, 58% iron, 8s. 9d.; magnetic ore, 60%, 10s. 9d. for lumps and 9s. for smalls. For manganiferous ores quotations vary from 9s. 6d. for 12% manganese and 35% iron, up to 14s. 3d. for 20% manganese and 20% iron.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton. Exports for the week were 300 tons to Marseilles, and there were also 250 tons copper pyrites shipped to the same port.

CHEMICALS AND MINERALS.

New York, Nov. 30.

Financially the trade is in better condition as evidenced by the higher prices ruling for future deliveries. Prompt business is small. Blue vitriol and sulphate of ammonia have been advanced. Nitrate of soda maintains its strength, and brimstone finds most buyers for the domestic output. Importers of brimstone are making deliveries on contracts taken some time ago, and in the absence of new business quote nominal prices. The sellers of domestic are now unloading the *American* cargo of 7,000 tons at New York, part of which will go to Philadelphia. It is thought that the new battery of boilers will be in place at the Louisiana mines by February, when the output will be nearly doubled. Phosphates are in good request. In October the Gafsa, Tunis, shipments amounted to 46,896 tons, making a total of 375,021 tons for the 10 months, chiefly to France, Italy and Great Britain.

Quotations for wholesale quantities are as below, f. o. b. New York, unless otherwise specified:

Brimstone,	Domestic 2ds, long ton	$21.45
	Domestic, 99.5%, long ton. (For Baltimore and Phila. add 25c.; Portland, 15c.)	21.75
	Foreign 2ds, long ton	21.75
	Foreign 3ds, long ton	20.75@21
Pyrite, Am. 42@44%, lump, unit, at shipping port		10@10½c.
	Am. fines, unit, at shipping port	8½@9c.
	Spanish, 46@52%, lump, unit	10@11½c.
	Spanish, fines, unit	9@10c.
Nitrate of soda, 95%, 100 lb.	spot	2.35
	shipments	2.32½@2.35
96%, 100 lb.	spot	2.37½
	shipments	2.35@2.37½
Sulphate of ammonia, gas liquor, 100 lb.	spot	3.15
	shipments	3.15@3.17
Bleaching powder, prime, 100 lb.		1.20@1.25
Cyanide, lb		19@20c.
Copper sulphate, 100 lb		5.125@5.25
Nitric acid, 36°, 100 lb.		4.50
38°, 100 lb.		4.75
40°, 100 lb.		5.00
42°, 100 lb.		5.25
Oxalic acid, com'l, 100 lb.		5.00@5.375
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk ton		21.00@23.00
Phosphate, Fla. rock, 77@80%, f.o.b. shipping port		7.25@ 7.50
Fla. rock, 77@80%, c.f. Europe		10.67@11.85
Fla. land pebble, 68@73%, f.o.b. shipping port		3.75@ 4.00
Fla. land pebble, 68@73%, c.f., Europe		7.70@ 8.40
Tenn. 78@80%, f.o.b., Mt. Pleasant		4.00@ 4.25
Tenn., c.i.f. Europe		10.27@10.67
Tenn., 78%, f.o.b.		3.75@ 4.00
Tenn., 78%, f.o.b.		3.75@ 4.00
Tenn., 75%, f.o.b.		3.25@ 3.50
So. Car., land rock, f.o.b. Ashley River		3.25@ 3.50
So. Car., river rock, f.o.b.		3.00@ 3.25
So. Car., river rock, c.i.f. Europe		6.33@ 6.56
Algerian, 63@70%, c.i.f		7.04@ 7.71
Algerian, 58@63%, c.i.f		6.15@ 6.60
Algerian, 53@58%, c.i.f		5.05@ 5.20
Algerian, 58@63%, c.i.f		6.15@ 6.60
Tunis, c.i.f		6.15@ 6.60
Christmas isle, 80@85%, c.i.f.		13.20@14.03
Ocean isle, 88%, c.i.f.		13.60@14.45

Concerning the position of nitrate of soda in Chile, Messrs. Jackson Bros., of Valparaiso, write us, under date of October 15, that during the early part of this fortnight a brisk demand set in, and several parcels of October-December deliveries exchanged hands at 7s. 9½d.@7s. 10d. alongside, but sellers now have retired from the market; for January-March delivery a chance sale was effected at 7s. 9½d. in Iquique. In the refined quality little has been done; 7s. 9½d. alongside was paid for January-March deliveries and 7s. 6d. for April-December. The market closes quiet, with very little offering. We quote: 95% October-December, 7s. 10½d.; January-February, 7s. 9d; April-December, 1905, 7s. 4d., all alongside sellers. The price of 7s. 10½d. alongside, with an all-round freight of 20s., stands in 9s. 9½d. per cwt., net cost and freight, without purchasing commission. Sales reported for the fortnight total 795,500 qtl., and re-sales, 271,000.

The interesting item in the salt trade is the resumption of operations by the reorganized United Salt Co., of Cleveland, Ohio. This plant, it will be remembered, was until its sale at auction recently, affiliated with the Eastern salt combination. The property was purchased by O. C. Barber, of Akron, O., who is president of the new company, while Frank Rockefeller is named as treasurer and manager.

Some attention is being paid to magnesite just now, as it is understood the larger interests in Greece have combined for mutual protection against outside competition. Until the new arrangements have been completed prices will continue nominal. Incidentally the trade is watching the developments in the industry in India, which is said to be promising. Simultaneously attention has been attracted to the new deposit in the Transvaal, but it is not thought that this supply will be available for some time yet, and then it is a question if the product can be marketed economically. Imports into the United States at present are largely of Styrian magnesite, which is intended mostly for conversion into refractory bricks. The Grecian magnesite received here is used chiefly in the preparation of liquid carbonic acid for making artificial mineral water. The calcined Grecian product is sold to makers of cement, bricks, ornamental tiles, etc., at high prices.

Liverpool. Nov. 16.

(*Special Report of Joseph P. Brunner & Co.*)

There is a fair trade reported in most lines of heavy chemicals, although the export demand cannot be called active.

Soda ash is in steady request. For tierces, nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@ £4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals find a fairly ready sale at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is meeting with a good inquiry and prices are firm, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching powder is quiet as regards export orders, but prices are unchanged at £4 15s.@£5 per ton, net cash, for hardwood as to market.

Chlorate of potash is held for 3 1-16@ 3 3-16d. per lb., net cash, as to quality and market, with a limited business passing.

Bicarbonate of soda is moving off at £6 15s. per ton, less 2½% for the finest quality in one-cwt. kegs, with usual allowances for larger packages; also special terms for a few favored markets.

Sulphate of ammonia continues upward, and £12 15s.@£12 17s. 6d. per ton, less 2½%, is now quoted for good gray 24-25% in double bags, f. o. b., here.

Nitrate of soda is strong at £11 5s.@£11 10s. per ton, less 2½% for double bags, f. o. b. here, as to quality.

METAL MARKET.

New York, Nov. 30.

Gold and Silver Exports and Imports.

At all United States Ports in October and year.

Metal.	October.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$352,177	$3,855,649	$41,889,028	$86,895,557
Imports.	5,026,036	8,005,223	36,666,708	76,699,893
Excess	I. $4,673,859	I. $4,149,574	E. $5,222,320	E$10 195,664
Silver:				
Exports.	3,143,492	3,485,008	28,026,927	42,615,018
Imports.	2,738,158	1,581,163	19,339,427	21,238,394
Excess	E. $405,334	E. $1,923,845	E. $8,687,500	E$21,376,624

These figures include exports and imports at all United States ports; they are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending November 26 and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$3,669,002	$32,285	$916,922	$159,133
1904.	94,942,489	5,765,073	33,078,776	1 104,483
1903.	31,653,185	13,347,443	29,197,585	3,194,047
1902.	25,023,792	2,567,821	23,664,503	1,094,884

The gold exported for the week went chiefly to France and Germany; the silver mostly to London. Imports were principally from Central America and the West Indies.

Activity seems to be increasing in most branches of trade, and the speculative markets are strong. No gold exports are noted this week.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending November 26, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$880,839,700	$1,102,420,900
Deposits	841,552,000	1,144,212,500
Circulation	46,036,500	42,126,500
Specie	152,241,200	217,957,800
Legal tenders	64,272,000	76,476,700
Total reserve	$216,513,200	$294,434,500
Legal requirements	210,388,000	286,053,125
Balance surplus	$6,125,200	$8,381,375

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'n.	$152,241,220	.....	$227,957,800	.....
England	159,466,180	.....	164,278,265	.....
France	479,506,690	$221,818,720	530,553,975	$221,041,665
Germany	172,850,000	60,730,000	178,060,000	62,560,000
Spain	72,580,000	94,655,000	74,315,000	99,215,000
Netherlands	20,569,000	31,819,500	27,623,500	30,339,000
Belgium	16,193,335	8,096,665	16,480,000	8,240,000
Italy	105,450,000	16,525,500	110,710,000	15,342,500
Russia	404,105,000	33,080,000	495,005,000	33,705,000
Austria	232,680,000	61,065,000	243,720,000	59,980,000

The returns of the Associated Banks of New York are of date November 26 and the others November 24, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market continues firm. Inquiry for silver is good, and supplies are at present rather short of the demand. Future prices running into January are well maintained.

The United States Assay Office in New York reports receipts of 36,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to November 17 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£5,670,330	£8,685,168 I.	£3,014,838
China	310,060	372,722 I.	62,662
Straits	721,879	79,268 D.	642,611
Totals	£6,702,269	£9,137,158 I.	£2,434,889

Receipts for the week this year were £117,000 in bar silver from New York, £2,000 from the West Indies, and £5,000 from Australia; also £30,000 in Mexican dollars from Hong Kong; total, £154,000. Shipments were £75,600 in bar silver to Bombay, £21,165 to Hong Kong and £2,500 to Madras; total, £99,265.

Indian exchange has been strong, on account of large exports from that country. All the Council bills offered in London were taken, the average price being 16.06d. per rupee. The demand for silver on Indian account has been steady.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.47½	$0.48½
Peruvian soles and Chilean pesos	.42½	.45
Victoria sovereigns	4.85	4.87
Twenty francs	3.87	3.90
Spanish 25pesetas	4.78	4.82

OTHER METALS.

SILVER AND STERLING EXCHANGE.

November.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	November.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
23	4.87	59	27⅛	28	4.86½	59	27⅜
24	.....	.....	27	29	4.86½	59⅛	27⅛
25	4.86½	58⅞	27⅛	30	4.86½	59⅛	27⅛
26	4.86½	58⅞	27⅛	.....	.....	.....	.....

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Daily Prices of Metals in New York.

November.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
23	14½ @15	14⅝ @14¾	14⅝ @14¾	66	29¼	4.20	5.65	5.50
24	.....	.....	.....	66⅛	.....	.....	.....	.....
25	14⅝ @15⅛	14⅝ @14¾	14¾ @14⅝	66⅛	29⅜	4.20	5.70	5.55
26	14⅞ @15⅛	14⅝ @14⅞	14¾ @14⅝	....	29⅜	4.20	5.70	5.55
28	14⅝ @15⅛	14⅝ @14⅝	14¾ @14⅝	66⅛	29⅜	4.20	5.75	5.60
29	14⅞ @15⅛	14⅝ @14⅞	14¾ @14⅝	67	30	4.20	5.75	5.60
30	14⅞ @15⅛	14⅝ @14⅞	14¾ @14⅝	67⅛ @30	29⅜	4.20	5.75 @5.80	5.60 @5.65

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire bars.

Copper has ruled rather quiet throughout the week, but there is a strong undertone. Consumption is reported to be very satisfactory indeed both here and abroad. The closing quotations are given as 14⅞@15⅛ for Lake; 14¾@14⅞ for electrolytic in cakes, wirebars and ingots, 14½@14⅝ for cathodes; 14⅜@14½ for casting copper.

The market for standard copper in London, which closed last week at £66 12s. 6d., opened on Monday at £66 17s. 6d., advanced on Tuesday to £67, and the closing quotations on Wednesday are cabled as £67 1s. 3d.@£67 2s. 6d. for spot, £67 11s. 3d.@£67 12s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £70@£70 10s.; best selected, £71@£71 10s.; strong sheets, £81 10s.@£82 10s.; India sheets, £77 10s.@£78 10s.; yellow metal, 6⅝@6¾d.

Tin.—During the week under review the bull party in London again made strong efforts to put up values. Prices over here at one time ruled as high as 30c., but at the close there is a somewhat easier tone, the quotations being given as 29⅞@30c. for spot, 29⅝@29¾c. for futures.

The foreign market, which closed last week at £135 10s., opened on Monday at £135 15s., advanced on Tuesday to £136 5s., and the closing quotations on Wednesday are cabled as £136@£136 1s. 3d. for spot, £134 15s.@£134 16s. 3d. for three months.

Exports of copper from New York and Baltimore for the week ending November 29 were 2,956 long tons, principally to Holland and Denmark. Imports were 41 tons copper.

Lead is quiet but firm without any special feature. The ruling quotations are given as 4.20 New York, 4.12½ St. Louis.

The foreign market is firm, Spanish lead being quoted at £12 17s. 6d.@£13, English lead £13@£13 2s. 6d.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of November 12, that the price of silver has been 14.75 reales per oz. Exchange is 34.34 pesetas to £1. Local quotation for pig lead is 71.25 reales per quintal, which, on current exchange, is equal to £11 12s. 3d. per long ton, f. o. b. Cartagena. Exports for the week were 400,000 kg. desilverized, 391,461 kg. argentiferous lead, and 3,305 kg. bar silver, all to Marseilles.

Spelter has scored another advance. There is a very good consumptive demand, while producers remain rather reluctant sellers, owing to the high prices asked for ore. The closing quotations are given as 5.60@5.65 St. Louis, 5.75@5.80 New York.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of November 12, that the demand for zinc ores continues strong, and further advances are expected. The current quotations are 74 pesetas per ton for blende, 35% zinc, and 53 pesetas for calamine, 30% zinc.

Antimony is quiet but firm, without any special feature. The closing quotations are 8⅛@8½ for Cookson's; 8¼@8⅜ for Hallett's; 8⅛@8¼ for U. S., Hungarian, Italian, French, Japanese and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are higher, at 19.50 per ounce.

Platinum in manufactured forms is higher. Messrs. Eimer & Amend, of New York, quote for different forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 74c.; crucibles and dishes, 78c.; perforated ware, 85c., and cones, $1 per gram.

Quicksilver.—Prices are steady. In New York large lots can be had at $40 per flask, and $41@$41.50 for smaller orders. The San Francisco quotation is $42@$42.50 for domestic orders, and $41 for export. The London price is £7 15s. per flask, with the same figure quoted by second hands.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

	Per lb.		Per lb.
Aluminum.			
No. 1. 99% ingots	33@37c	Ferro-Chrom. (74%)	12½c.
No. 2. 99% ingots	31@34c	Ferro-Tungsten (37%)	45c.
Rolled Sheets	4c up	Magnesium, pure	
Alum-bronze	20@23c.	(N. Y.)	$1.60
Nickel-alum	33@39c.	Manganese, (98@99%	
Bismuth	$2.10	N. Y.)	75c
Chr'm'm, pure (N.Y.)	80c.	Manganese Cu., (30@70%	
Copper, red oxide	50c.	N. Y.)	40c.
Fe.-Molybd'm (50%)	$1.00	Molybdenum, (98@99%	
Ferro-Titanium (20@25%		N. Y.)	$2.75
N. Y.)	75c.	Phosphorus, foreign	45c.
Ferro-Vanadium, (25%		Phosphurus, American	70c.
N. Y.)	$3.00	Sodium metal	50c.
		Tungsten (best)	$1.25

Differences in price depend chiefly upon size and conditions of order.

Missouri Ore Market. Nov. 26.

(From Our Special Correspondent.)

The highest price paid for zinc ore was $49 per ton, the top price having been lowered $1, though the assay basis remained as strong as in the previous week, at $45@$48 per ton of 60% zinc. One bin containing 1,300,000 lb. of lead was sold at $60.50 per ton f. o. b., but $58 was the highest, with this exception. The zinc shipment was 21 tons and the lead shipment 437 tons greater than the big week of the boom year of 1899, when the highest price for zinc ore was $55 per ton. At that time lead was, however, only $51 per ton, and the value of both ores was $285,310, against $296,460 the past week. With the eleven months ending today the shipment of zinc and lead has aggregated in valuation $10,063,320, within half a million as much as the whole of 1899, and $1,159,090 ahead of last year. A year ago the highest price for zinc was $35 and the assay basis $28@$32 per ton of 60% zinc.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week:

	Zinc lb.	Lead lb.	Value.
Webb City-Carterville	2,805,520	454,720	$74,900
Joplin	2,699,080	319,620	71,350
Duenweg	942,040	217,510	27,980
Prosperity	322,530	568,390	24,610
Galena-Empire	954,190	118,620	24,130
Alba-Neck	680,970	.....	16,340
Badger	482,320	4,690	11,710
Aurora	504,300	7,960	7,490
Granby	390,000	96,000	7,430
Oronogo	303,780	2,440	7,080
Carthage	238,660	.....	5,730
Stott City	125,680	32,550	3,800
Sherwood-Mitchell	136,340	19,440	3,700
Zincite	120,450	.....	2,640
Beef Branch	94,300	29,930	2,160
Central City	79,540	4,070	1,700
Diamond	63,950	.....	1,410
Reeds	63,390	.....	1,390
Spurgeon-Spring City	39,000	1,900	910
Totals	11,046,040	1,877,840	$296,490
Eleven months	480,008,590	61,419,520	$10,063,320
Zinc value, the week	241,690; 47 weeks,		$8,395,610
Lead value, the week,	54,770; 47 weeks,		1,667,710

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan ...	28.33	28.845	4.075	4.347	4.865	4.863
Feb ...	29.43	28.087	4.075	4.375	5.043	4.916
Mar. ..	30.15	28.317	4.442	4.475	5.349	5.057
April ..	29.81	28.132	4.567	4.475	5.550	5.219
May. ..	29.51	27.718	4.325	4.423	5.639	5.031
June ..	28.34	26.325	4.210	4.196	5.697	4.760
July ...	27.68	26.573	4.075	4.192	5.662	4.873
Aug. ..	28.29	27.012	4.075	4.111	5.725	4.866
Sept ..	26.77	27.780	4.243	4.200	5.686	5.046
Oct ...	25.92	28.596	4.375	4.200	5.510	5.181
Nov. ..	25.42	29.185	4.218	4.200	5.038	5.513
Dec ...	27.41	.....	4.162	.....	4.731	.....
Year...	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c; September, 4.896c; October, 5.033c; November, 5.363c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan ..	12.159	12.410	12.361	12.553	53.52	57.500
Feb. .	12.778	12.063	12.901	12.245	57.34	56.500
Mar. .	14.416	12.299	14.572	12.551	63.85	57.321
April .	14.454	12.923	14.642	13.120	61.72	58.247
May..	14.435	12.758	14.618	13.000	61.73	57.321
June .	13.942	12.269	14.212	12.399	57.30	56.398
July..	13.094	12.380	13.341	12.505	56.64	57.256
Aug. .	12.962	12.343	13.159	12.468	58.44	56.952
Sept .	13.205	12.495	13.345	12.620	56.82	57.645
Oct ..	12.801	12.993	12.954	13.118	55.60	60.012
Nov. .	12,617	14.284	12.813	14.456	56.30	65.085
Dec ..	11,952	.....	12,084	.....	56.36	.....
Year..	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan ...	25.62	55.56	21.98	47.57	26.423	57.055
Feb ...	25.41	55.09	22.11	47.89	26.665	57.592
Mar...	25.00	54.23	22.49	48.72	26.164	56.741
April..	24.34	52.72	23.38	50.56	24.974	54.202
May...	23.71	51.31	24.89	54.11	25.578	55.430
June ..	24.17	52.36	24.29	52.86	25.644	55.673
July...	24.38	52.88	24.86	53.92	26.760	58.095
Aug...	24.23	52.52	25.63	55.36	26.591	57.806
Sept ...	23.88	51.52	26.75	58.00	26.349	57.120
Oct ...	23.40	50.57	27.89	60.36	26.760	57.923
Nov. ..	22.70	49.07	27.01	58.11	26.952	58.453
Dec ...	22.21	48.03	25.73	55.375	.....	.....
Year...	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Payable.	Rate.	Amount.
†Ala. Con. C. & I., pf.	Dec. 1	$1.75	$43,117
*Annie Laurie, Utah.	Dec. 12	.50	12,500
*Bunker Hill & Sull.	Dec. 4	.25	75,000
†Calumet & Ariz	Dec. 15	1.50	300,000
Calumet & Ariz.,extra	Dec. 15	.50	100,000
†Calumet & Hecla ...	Dec. 20	10.00	1,000,000
Centennial-Eureka ...	Dec. 1	1.00	200,000
*Central Eureka, Cal.	Dec. 12	.05	19,921
†Federal, M. & Sm...	Dec. 15	1.50	150,000
†Federal, pf.	Dec. 15	1.75	87,500
†General Chem., pf...	Jan. 3	1.50	150,000
Greene Con., Mex....	Dec. 20	.40	345,600
†National Lead, pf ..	Dec. 15	1.75	260,820
*New Century, Z. & L.	Dec. 1	.01	1,500
Parrot, Mont	Dec. 12	.50	114,925
†Standard Oil	Dec. 15	7.00	6,790,000
St. Eugene, B. C....	Dec. 15	.02	64,040
Stratton's Independ..	Dec. 19	.12½	125,001
*Tetro, Utah	Dec. 1	.01	3,000
United, Colo.	Dec. 5	.005	20,046

*Monthly. †Quarterly.

ASSESSMENTS.

Company.	Delinq.	Sale.	Amt.
Bonanza, Utah ...	Nov. 21	Dec. 8	.04
Caledonia, Nev ...	Nov. 21	Dec. 12	.10
ChallengeCon.,Nev	Dec. 19	Jan. 10	.10
Chollar, Nev	Dec. 15	Jan. 5	.10
Con.Imperial, Nev.	Dec. 6	Jan. 4	.01
Esperanza, Cal ...	Dec. 19	.....	.01
Exchequer, Nev...	Nov. 28	Dec. 20	.05
Gould & Curry ...	Nov. 25	Dec. 14	.10
Great Dane, Cal ..	Dec. 9	.....	.03
Jenny Lind, Cal ..	Dec. 8	.....	.01
Julia Con., Nev...	Dec. 8	Dec. 29	.03
Justice, Nev	Dec. 5	Dec. 23	.05
Maple, Utah	Dec. 14	Dec. 30	.00½
Pac.Gyp. & Marble	Dec. 7	.....	5.00
Petro, Utah.	Dec. 6	Dec. 24	.02
Potosi, Nev	Nov. 22	Dec. 13	.10
Ridge & Valley, U.	Dec. 28	Jan. 14	.00½
Sharp, Utah	Dec. 15	Jan. 5	.00½
Silver-Copper, U. .	Dec. 19	Jan. 9	.01
Wabash, Utah	Nov. 24	Dec. 15	.05
West.Mineral., Cal.	Dec. 21	.....	3.75
Yuba Con., Cal ...	Dec. 20	.....	.01

NEW YORK.

Company.	Par val.	Nov. 22 H.	Nov. 22 L.	Nov. 23 H.	Nov. 23 L.	Nov. 25 H.	Nov. 25 L.	Nov. 26 H.	Nov. 26 L.	Nov. 28 H.	Nov. 28 L.	Nov. 29 H.	Nov. 29 L.	Sales.
Acacia	1					.06								500
Amalgamated, C..	100	80½	78¼	78½	77½	78¾	76½	80¾	78¾	81½	79¼	81¾	.80	568,390
Anaconda	25	118½	117	113¾	113	114¾	114	115	....	116	115½	1.16	115¾	5,250
Best & Belcher.	3									1.10				100
Bullion	1									.25				500
Challenge	2½			.16						.16				800
Chollar.	10									.20		.20		400
Confidence	3					.81								200
Con. Cal. & Va...	2½	1.85		1.85		1.85		1.85		1.85		1.90	1.85	1,000
Cripple Creek Con.	1	.13	.12	.13		.13	.12	.12		.12				4,100
Elkton Con	1	.67	.66	.67		.69	.68			.67				1,700
Federal Mg. & Sm.	100	55	54½	54	53¼	52½		56	55	58	57	.61	.58	4,812
Preferred	100	74		74	71	74	72½			77	76	80½	.76	5,900
Gold Dollar.	1	.06		.06		.06		.06		.07	.06			3,500
Gold Sovereign..	1							.07			.29½	.08	.07	1,500
Greene Con.	10	29½	28¾	29½	28¼	30½	29	30½	30	31½	....	.31	30½	121,800
Hale & Norcross.	3	.73	.72	.74		.86	.85			1.20		1.10		1,400
Homestake.	100													
Horn Silver	20					1.55								300
Isabella.	1	.20						.21		.23		.24		2,000
Justice	1									.06				1,000
Keystone.	1											.05		500
Leadville.	10													500
Little Chief.	50					.03				.05				300
Mexican	10									1.20				400
Moon Anchor	5					.06								1,000
Moulton.	25											.14		100
Occidental	3	.80				.81								200
Ontario	100	4.25	4 12½	3.90						3.90				230
Ophir.	3	2.25		.220				2.30		2.50		2.40		750
Overman	1			.13										200
Pharmacist.	1	.04										.04		3,000
Phœnix	1	.15		.15		.16	.15			.15		.14		3,500
Portland.	1					1.70								300
Potosi	1			.20		.20		.20						500
Quicksilver	100	2.75	2.50			2 50		2.50		2.60	237½	2.50		2,040
Quicksilver pf.	100					6.00						5.50	5.25	370
Savage	3											.36		300
Sierra Nevada	10									.50	.49	.47		500
Tennessee C....	25	39½	37½	38	36	38½	37½	37½	36½	39½	37½	40½	.38	21,800
Union Con.	10											.58	.57	200
Union Copper.	10	2½	1½	1½	1½	1½	....	1½	....	2	....	2	1½	3,100
United Copper	100	10	....	9½	9	9	....	....	....	10	....	10	9½	1,600
United Cop. pf.	100													
Utah	1	.07												500
White Knob.	10	1½	1½	1½	1⅛	1½	1	1⅛	1½	1½	⅛	1	⅛	15,600
Work.	1	.09	.08	.09				.09		.09				3,000
Yellow Jacket	3													

Total sales, 785,542 shares. Nov. 24, Holiday.

SALT LAKE CITY.*

Nov. 26

Company	Par Val	High.	Low.	Sales.	Company.	Par Val	High.	Low.	Sales.
Ajax	$1	.14	.14	205	May Day	$1	.32½	.29½	30,300
Beck Tunnel Con	1	.11½	8½	3,350	Martha Wash.	1	1½	1½	2,000
Butler-Liberal	1	.11½	.11¼	2,600	N. Y. Bonanza...	1	.24	.20½	22,800
Carisa	1	.14½	.14½	600	Petro.	1	7	7	500
Century	1	.18	.16	1,100	Sacramento	5	.10½	.10½	3,600
Con. Mercur	5	.42½	.42½	50	Silver Shield	1	.14½	.12½	22,000
Columbus Con	1	1.27½	1.25	300	Star Con.	1	.16½	.16	5,000
Daly.	20	2.60	2.33	1,800	Swansea.	5	.30	.30	100
Daly-Judge	1	4.50	4.25	750	Tetro.	1	.22	.22	500
Daly-West	20	13.50	13.00	425	Victor Con.	1	6½	.5½	2,500
Eagle & Blue Bell.	1	.90	.90	430	Victoria	1	2.22	2.00	1,325
Little Chief	1	2½	2	52,000	Wabash	1	.60	.55	600
Lower Mammoth.	1	.19	.19	500	Yankee Con		.38½	.36	7,200

*By our Special Correspondent. Total sales, 163,535 shares.

BOSTON, MASS.

Company.	Par val.	Nov. 22 H.	Nov. 22 L.	Nov. 23 H.	Nov. 23 L.	Nov. 25 H.	Nov. 25 L.	Nov. 26 H.	Nov. 26 L.	Nov. 28 H.	Nov. 28 L.	Nov. 29 H.	Nov. 29 L.	Sales.
Adventure Con...	$25	6½	5½	6½	6½	6½	6	6½	....	6½	6½	6½	....	1,372
Allouez.	25	18½	18	18½	18	18½	17½	18½	18	19	18	18½	17½	13,137
Amalgamated ...	100	81	78½	78½	77½	78½	76½	80½	78½	81½	79½	81½	80½	52,285
Am. Z. L. & Sm...	25	13½	13	13½	....	12½	....	13	....	13	....	13½	....	510
Anaconda.	25	....	....	23	....	....	....	....	....	29½	29	....	....	305
Arcadian.	25	2½	2	2	1½	2	1½	2½	2	2	....	2	1½	1,391
Arnold.	25	1½	1	....	....	....	....	1½	1½	1½	1	....	....	725
Ash Bed.	25	.50	....	50	....	....	....	....	....	25	....	....	....	900
Atlantic	25	19½	17½	18	17	18½	17½	19	18	19	18½	18½	17	14,133
Bingham Con.	50	38½	37½	38½	37½	38½	37½	37½	37½	38	37½	37½	37½	15,597
Bonanza	10	1.00	.90	.90	....	.90	.85	.90	....	....	....	95	90	2,325
Boston Con.	5	7½	7½	7½	7	7½	7½	7½	7½	7½	7½	7½	7½	14,770
Calumet & Hecla .	25	680	670	670	665	660	....	680	660	680	....	680	....	263
Catalpa	10	.20	....	.20	....	....	....	.20	....	.20	....	....	....	850
Centennial	25	30	29	29	28	29	28½	29½	29½	29½	28½	29½	28½	4,420
Con. Mercur	5	45	.42	.40	.38	.35	....	....	....	.45	.35	.44	.40	4,680
Continental Zinc	25	....	....	11	....	....	....	....	....	....	....	....	....	20
Copper Range ...	100	72½	70½	71	69½	70½	69	72½	71	72½	71½	72½	71½	19,414
Crescent.	10	.12	.10	.12	....	.12	....	.10	....	.12	....	....	....	2,610
Daly-West	20	14	13	13½	13¼	14	13½	14	....	14½	13½	14½	14	2,276
Elm River	12	3½	3	3½	3	3	....	....	....	3½	....	3½	3	805
Franklin	25	13½	12½	13½	12½	12½	12½	13	....	13	....	13½	13½	1,132
Granby Con.	10	5⅝	5	5½	5	5⅝	5⅝	5⅝	5½	5½	5½	5⅝	5½	54,713
Greene Con.	10	29½	28¼	29½	28¾	30½	29	30½	29½	31	30	31	30⅝	25,783
Guanajuato Con.	10	3	2½	2¾	....	3	....	3	2¾	3	2¾	3½	3	6,164
Humboldt.	25	....	....	....	....	....	....	....	....	1.00	.90	....	....	250
Isle Royal Con.	25	31	29	30½	29	31	30	31	30½	30½	29	29	27½	10,630
Mass Con.	25	8	7¾	8	7¾	7¾	7¾	8½	8	8½	8½	9½	8⅝	6,236
Mayflower	25	1½	....	1⅝	1½	....	....	1½	....	1⅝	1½	....	....	1,135
Michigan.	25	10½	10	10	9½	10	....	10½	10	10½	9½	10	9½	2,130
Mohawk	25	55½	54½	55	54½	55½	55	56½	55½	57	55½	57	56½	4,639
Mont. Coal & C.	25	4½	....	4½	4⅛	4⅝	4½	4½	4	4½	4⅝	4½	4½	10,280
Old Colony.	25	....	....	....	....	2	....	....	....	1½	....	....	....	65
Old Dominion ...	25	28	27	28½	27	27½	....	28½	28	29	27½	28½	27½	5,402
Osceola	25	97½	95	95	94	96	95½	97½	96	97	96	96	94½	2,561
Parrot.	10	33	31½	32	29½	‡30½	30	31	30½	32½	31	32½	31½	2,747
Phœnix Con.	25	3½	....	3½	3½	....	....	3½	....	3½	....	3½	3½	850
Quincy	25	119	117	....	....	115	....	115	....	120	116	118	117	146
Rhode Island.	25	2½	2½	....	....	2½	....	....	....	2½	....	2½	2	515
Santa Fe.	10	3½	2½	3	2½	3	2½	2½	2½	3	2½	3	2½	2,479
Shannon	10	9½	8½	9½	9	10½	9½	10½	10½	10½	10½	10½	10	65,207
Tamarack.	25	130	125	130	125	127	125	130	....	132	....	130	....	434
Tecumseh	25	4	2½	4	3½	3½	....	4¼	4	4½	4	4½	3½	5,490
Tennessee	25	39½	....	....	....	....	....	....	....	....	....	40½	38½	2,450
Trinity	25	16½	14¼	14	13	13½	13	14¼	13½	15½	14	15½	14½	17,391
Union.	100	....	....	....	....	4	....	4	....	....	....	....	....	50
United States.	25	26	24½	25½	24½	25½	24½	27½	26	27½	26½	27½	26½	72,941
U.S.Coal & Oil.	25	12½	12¼	12½	12	12½	12	12½	12	12½	11½	12½	12	3,489
Utah Con	5	46	44½	45	44½	45½	44½	46	45½	46	45½	45½	44½	16,946
Victoria.	25	5½	....	5⅝	5½	5½	5	5½	5	5½	5⅝	5½	5½	1,500
Washington.	25	....	....	....	....	....	....	.70	....	.50	....	....	....	225
Winona.	25	11½	11¼	11¼	11	11½	11¼	11½	11	11¼	11	11½	11	1,735
Wolverine.	25	109	108	107½	106	109	108	109	108	109	....	110	108½	962
Wyandot	25	2⅜	2½	2⅜	2½	2⅜	2⅜	....	....	2⅜	....	2½	2⅜	1,687

‡ Ex-dividend. Total sales, 481,152 shares.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Nov. 22 H.	Nov. 22 L.	Nov. 23 H.	Nov. 23 L.	Nov. 25 H.	Nov. 25 L.	Nov. 26 H.	Nov. 26 L.	Nov. 28 H.	Nov. 28 L.	Nov. 29 H.	Nov. 29 L.	Sales.
Allis-Chalmers ...	$100	20½	18½	19½	19	19	....	21½	20	20½	20	20	19½	5,400
Allis-Chalmers pf.	100	70½	69½	69¾	69	....	....	71	....	71	....	69	....	2,400
Am. Agri. Chem ..	100	21½	21	....	....	....	....	....	....	....	....	....	....	200
Am. Sm. & Ref. ..	100	82	79½	81½	79½	81½	80½	81½	81	82½	81½	81½	81	83,250
Preferred	100	114½	114	114	113	114	113	....	....	....	....	113½	113½	2,400
†Cambria Iron ...	50	47	....	....	....	47	....	47	....	....	....	47½	....	125
†Cambria Steel...	50	25½	25½	25½	25	25½	25½	25½	25½	26	25½	25½	25½	6,861
Col. Fuel & Iron..	100	49½	47½	48½	47	51	47½	52½	51½	53½	52½	58½	56½	244,900
Col. Fuel & Iron pf	100	85	84	....	....	90	....	90½	....	90½	....	92½	....	1,000
Col. & H. C. & I..	100	16	15	15½	15	15½	....	16	15½	16½	16	17½	16½	8,860
General Chem. pf..	100	....	....	98	....	98½	....	....	....	....	....	100	99½	500
†Lehigh C. & N...	50	97½	96	97½	95	100	97½	104½	100	107	103½	108½	105	21,650
*Mong. R. Coal...	50	10	....	10	....	11	10	....	....	....	....	....	....	155
Preferred.	50	30½	30	30	29½	30	....	30	....	....	....	31	30½	650
National Lead ...	100	24½	23½	23½	23	24	23½	23¾	....	23⅜	23½	23½	....	4,500
Preferred	100	....	....	96½	....	‡94½	....	....	....	....	....	....	....	200
Phila. Nat. Gas..	50	41½	40½	41	40½	41	40½	40½	40½	41½	41	41½	41½	5,147
Preferred	50	45½	....	45½	....	....	....	....	....	46½	46	46½	46½	688
*Pittsburg Coal ..	100	22	21½	21½	....	....	....	22½	22	22½	22	22	21½	6,520
Preferred	100	79½	78½	78½	78½	78½	....	79½	78½	81	80	81½	81	8,478
Republic I. & S ..	100	17½	16½	16½	16	17½	16½	18	17½	18½	17½	18½	17½	37,610
Preferred	100	69½	68½	68½	68	69½	68½	71½	69½	73½	72	72½	71½	21,314
Sloss-Shef. S. & I .	100	62½	62	62½	60½	62½	62	63	62½	62½	....	62½	62½	4,700
Preferred	100	....	....	....	....	100	....	....	....	100	....	....	....	300
Standard Oil.....	100	626	624	625	623	628	....	632	629	630	....	....	....	213
Tenn. C. I. & R.R.	100	76½	74½	75	73	77½	74½	77	76½	77½	76½	77½	76	55,311
U. S. Steel Corp ..	100	28½	27½	27½	26½	29½	27½	29½	29½	31½	29½	32½	31½	944,515
Preferred	100	90½	80	90½	85½	94½	90½	95½	94½	95½	94½	94½	93½	817,652
Va.-Car. Chem...	100	41½	40½	40½	40	41½	41	40½	40½	42	41	41½	40½	9,410
Preferred	100	113½	113	113½	....	113½	112½	113	112½	114½	113½	114	....	3.150

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange. Nov. 24, Holiday. ‡Ex-dividend. Total sales, 2,297,559 shares.

STOCK QUOTATIONS.

SAN FRANCISCO.*

Company.	Location.	Nov. 17		Nov. 18		Nov. 19		Nov. 21		Nov. 22		Nov. 23		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
MacNamara	Nev	.25	.24	.25	.24	.25	....	.25	.24	.26	.25	.25	....	28,500
Mont. Tonopah	Nev	1.70	167½	1.75	....	172½	1.70	172½	167½	....	....	177½	172½	3.700
Ton. Belmont	Nev	.69	.68	.72	.69	....	....	.71	.69	....	....	.70	.68	6.000
Ton. Midway	Nev	.38	.36	.38	.37	.38	.37	.37	.36	.37	.36	.36	.35	28.000
Ton. Mg. Co	Nev	....	....	....	....	....	....	....	....	....	....	....	....	....
Ton. North Star	Nev	....	....	....	....	....	....	....	....	....	....	.16	....	1,500

*San Francisco & Tonopah Exchange. Total sales, 67,700 shares.

SAN FRANCISCO (By Telegraph).

Company.	November.		Company.	November.	
	28	29		28	29
Belcher	$0.25	$0.24	Gould & Curry	$0.26	$0.26
Best & Belcher	1.15	1.10	Hale & Norcross	1.05	1.10
Caledonia	.47	.46	Mexican	1.15	1.15
Challenge Con.	.17	.19	Ophir	2.30	2.35
Chollar	.19	.18	Overman	.14	.14
Confidence	.86	.85	Sierra Nevada	.47	.47
Con. California & Virginia	1.80	1.80	Union Con	.57	.57
Crown Point	.18	.18	Yellow Jacket	.18	.19

COLORADO SPRINGS (By Telegraph).

Company.	Nov. 28		Nov. 29		Company.	Nov. 28		Nov. 29	
	H.	L.	H.	L.		H.	L.	H.	L.
Anaconda	.10	....	12	.10	Jack Pot	.03½	....	.03½	.03
C. K. & N.	.22	....	....	....	Last Dollar	.25	....	....	....
Cripple Ck. Con.	.10½	.10½	.11	.10½	Mollie Gibson	.04½	....	.04½	.03½
Doctor Jack Pot	.04½	.04½	.04½	.04½	Moon Anchor	.05½	....	.06½	.05½
Elkton Con	.69½	.68½	.69½	.69	Old Gold	.08½	.08½	....	....
El Paso	1.15½	1.15½	1.15½	1.15	Pharmacist	.04	.03½	.04	.03½
Gold Dollar	.07½	.07	.07½	.07	Portland	1.77	1.72½	1.77	1.72
Gold Sovereign	.07½	.07	.07½	.07	Vindicator Con	.70	.68	.71	....
Isabella	.24	.22	.27	.26½	Work	.09½	.09	.09½	.09½

ST. LOUIS, MO.* Nov. 26.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid	Ask.
Am. Nettie, Colo	$10	$0.15	$0.20	Columbia Lead, Mo.	$10	$0.25	$1.90
Center Creek	10	1.40	2.00	Con. Coal, Ill	100	12.50	16.00
Central Coal & C.	100	62.25	63.00	Doe Run Lead, Mo.	100	110.00	115.00
Central C. & C., Pf	100	70.00	72.00	Granite Bimet., Mont.	10	.30	.40
Central Lead, Mo.	100	110.00	115.00	St. Joe Lead, Mo	10	14.00	16.00

*By our Special Correspondent.

DULUTH, MINN. Nov. 26

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Black Mountain	$1	$1.10	$1.25	Lake Sup. & Pi'ts	$10	$50.50	$51.00
Calumet & Arizona	10	114.00	115.00	Pitts. & Duluth	15	25.50	26.00
Calumet & Pittsburg	10	41.00	42.00	Shakespeare	1	....	.20
Houghton Develop	10	6.00	7.00	United Mexican	10	....	.25
Junction Development	15	72.00	73.00	Wolverine & Arizona	10	6.50	7.00

MONTREAL.* Nov. 26.

Company.	Par Val.	High	Low	Sales	Company.	Par Val.	High	Low	Sales
Dominion Coal	100	63.00	61.00	213	Montreal Steel	100	....	....	....
Dom. Coal, Pf	100	115.00	....	10	Mont'l Steel, Pf	100	95.00	....	25
Dom. I. & St	100	18.00	17.00	927	Nova Scotia St.	100	68.00	66.00	1,372
Dom. I. & St., Pf.	100	48.00	46.50	193	N. S. Steel, Pf	100	110.00	109.00	41

*Montreal Stock Exchange. Total sales, 2,781 shares.

MEXICO. Nov. 18

Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:				Soledad, aviada	$670	$1,300	$1,350
Ca. Min. de Penoles	2,500	$2,600	$3,000	Sorpresa, aviada	960	335	350
San Andres de la Sierra	200	10,000	....	MEXICO:			
GUANAJUATO:				Aldebarren	2,000	54	63
Cinco Senores y An. aviadoras	2,000	30	36	Buen Despacho	3,000	60	80
Cinco, Senores y An. aviada	400	30	36	Dos Estrelias	3,000	3,230	3,375
Providencia, San Juan de la Luz	6,000	150	165	La Esperanza (El Oro)	3,000	1,500	1,500
GUERRERO:				Santa Ana, Esperanza	2,400	15	30
Garduno y Anexas	7,200	30	35	NUEVO LEON:			
HIDALGO:				La Fraternal	1,000	580	620
Amistad y Con.	9,600	70	73	Norias de Bajan	1,000	500	600
Carmen, aviada	1,100	230	250	SAN LUIS POTOSI:			
Guadalupe Fresnillo Mill	1,000	170	200	Concepcion y An	3,000	50	70
Guadalupe Fresnillo Mine	1,400	70	80	El Barreno, aviadora	2,000	80	90
Maravillas y An., aviador	1,680	90	110	Sta. Maria de la Paz	9,600	251	255
Maravillas el Lobo	1,000	130	180	ZACATECAS:			
Refugio, aviada	12,800	5	7	Asturiana y An	2,500	16	21
Sta. Gertrudis y An. aviadas	9,600	10	12	Candelaria y Pinos	2,500	35	40
Sta. Gertrudis y An. aviadora	28,800	78	80	San Carlos y Annexas	2,500	35	45
San Rafael y An., Trompillo	1,200	2,400	2,470	Sta. Maria de Gaud	2,500	100	105
San Rafael y An., aviada	1,200	800	828	MISCELLANEOUS:			
				Bartolome de Medina	2,000	99	100
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oxaca) aviadora	1,800	870	900
				San Francisco Hac.	6,000	70	80
				Union Hacienda	3,000	375	385

LONDON Nov. 18

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
American:		£ s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell	200,000	5 0 0	4 0	Oct., 1904	4 15 0	5 0 0
Anaconda	1,200,000	5 0 0	2 0	Nov., 1904	6 7 6	6 10 0
*Camp Bird	820,000	1 0 0	9	Nov., 1904	1 9 0	1 9 6
Copiapo	112,500	2 0 0	5 0	Oct., 1904	1 7 6	1 2 6
*De Lamar	80,000	1 0 0	2 0	Nov., 1904	13 9	16 3
El Oro	1,080,000	1 0 0	9	July, 1904	1 0 0	1 2 6
Frontino & Bolivia	140,000	1 0 0	rts.	Mar., 1904	6 6	7 6
Le Roi	200,000	5 0 0	5 0	Nov., 1899	15 0	17 6
Le Roi No. 2	120,000	5 0 0	1 0	June, 1904	16 3	18 9
Mesquital	250,000	1 0 0	3	Feb., 1903	2 6	3 0
Palmarejo & Mexican	445,000	1 0 0	rts.	Apr., 1903	8 9	9 3
Standard	500,000	4 0	1½	Sept., 1903	1 0	2 0
Stratton's Independence	1,000,007	1 0 0	6	Dec., 1904	5 9	6 3
St. John del Rey	546,265	1 0 0	6	Dec., 1904	15 0	16 0
Tomboy	300,000	1 0 0	1 0	June, 1902	1 2 6	1 7 6
Ymir	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
Linares	15,000	3 0 0	5 0	Sept., 1904	4 0 0	4 10 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	3 2 6	3 7 6
*Rio Tinto	325,000	£ 0 0	32 6	Nov., 1904	62 7 6	62 12 6
Rio Tinto, preferred	325,000	5 0 0	2 6	Nov., 1904	6 2 6	6 7 6
Tharsis	625,000	2 0 0	7 0	May, 1904	5 0 0	5 5 0
West Australian:						
Associated	495,388	1 0 0	2 6	July, 1904	1 15 0	1 17 6
Cosmopolitan	400,000	1 0 0	1 0	Apr., 1904	6 0	6 6
Golden Horseshoe	300,000	5 0 0	6 0	Nov., 1904	7 5 0	7 7 6
Great Boulder	1,750,000	2 0	9	Sept., 1904	1 0 6	1 1 0
Gt. Boulder Persever'ce	1,400,007	1 0 0	1 0	Sept., 1904	12 0	12 6
Great Fingall	250,000	1 0	7 0	Oct., 1904	8 2 6	8 5 0
Ivanhoe	200,000	5 0 0	5 0	Oct., 1904	7 13 9	7 16 3
Kalgurli	120,000	1 0 0	2 6	Oct., 1904	5 15 0	5 17 6
Lake View	250,000	1 0 0	1 6	Oct., 1904	1 1 3	1 3 9
Oroya-Brownhill	450,000	1 0 0	4 0	Dec., 1904	3 11 3	3 12 6
Miscellaneous:						
Brilliant Central	100,000	1 0 0	1 0	Nov., 1904	1 15 0	2 0 0
Briseis	600,000	1 0 0	....	....	10 3	10 9
Broken Hill	960,000	8 0	1 0	Nov., 1904	2 3 6	2 4 6
Mt. Lyell	1,200,000	3 0 0	1 3	June, 1904	13 0	14 0
*Mt. Morgan	1,000,000	1 0 0	3	Nov., 1904	2 7 6	2 10 0
Waihi	497,412	1 0 0	2 6	Dec., 1904	5 18 9	6 1 3
Indian:						
Champion Reef	2,000,000	10 0	1 4	Sept., 1904	1 13 0	1 14 0
*Mysore	580,000	10 0	4 6	Nov., 1904	6 8 9	6 11 3
Nundydroog	484,000	10 0	1 6	Nov., 1904	1 14 0	1 15 0
Ooregum	683,000	10 0	9	Dec., 1904	17 6	18 9
Ooregum, pfd	240,000	10 0	9	Dec., 1904	1 6 3	1 8 9
South African:						
Angelo	600,000	1 0 0	7 0	Aug., 1904	7 3 9	7 6 3
Bonanza	200,000	1 0 0	8 0	Aug., 1904	1 3 9	1 6 3
British South Africa	4,568,392	1 0 0	rts.	May, 1899	1 14 7	1 15 9
Cape Copper	300,000	2 0 0	2 6	July, 1904	4 12 6	4 15 0
Cape Copper, pfd	45,000	2 0 0	2 6	July, 1904	4 2 6	4 7 6
City & Suburban	340,000	4 0 0	4 0	Aug., 1904	6 3 9	6 6 3
Consol. Gold-Fields	2,000,000	1 0 0	2 6	Nov., 1904	7 8 9	7 11 3
*Crown Reef	120,000	1 0 0	18 0	Nov., 1904	15 0 0	15 10 0
De Beers, preferred	800,000	2 10 0	10 0	Aug., 1904	18 7 6	18 10 0
De Beers, deferred	1,000,000	2 10 0	12 6	Aug., 1904	18 12 6	18 15 0
East Rand	990,000	1 0 0	5 0	July, 1903	8 15 0	8 16 3
Ferreira	95,000	1 0 0	22 6	Aug., 1904	23 0 0	23 10 0
Geldenhuis	200,000	1 0 0	5 0	Aug., 1904	5 15 0	5 17 6
Gould	400,000	1 0 0	rts.	Mar., 1902	7 2 6	7 3 9
Henry Nourse	125,000	1 0 0	8 0	Aug., 1904	8 7 6	8 12 6
Jubilee	50,000	1 0 0	5 0	Aug., 1904	3 15 0	4 5 0
Jumpers	100,000	1 0 0	2 6	May, 1904	2 6 3	2 8 9
Langlaagte	470,000	1 0 0	2 0	Aug., 1904	3 18 9	4 0 0
May	288,750	1 0 0	3 0	Aug., 1904	4 2 6	4 5 0
Meyer & Charlton	100,000	1 0 0	5 0	Aug., 1904	5 10 0	5 15 0
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	10 13 9	10 16 3
Namaqua	94,331	2 0 0	2 6	June, 1904	3 15 0	4 0 0
New Jagersfontein	200,000	5 0 0	15 0	Dec., 1904	28 10 0	28 15 0
New Primrose	325,000	1 0 0	3 0	Aug., 1904	3 10 0	3 12 6
Rand	1,795,956	5 0	5 0	Aug., 1904	11 3 9	11 5 0
Robinson	550,000	5 0 0	6 0	Aug., 1904	10 2 6	10 7 6
Robinson Deep	950,000	1 0 0	3 0	Aug., 1904	5 11 3	5 13 9
Rose Deep	425,000	1 0 0	3 0	Aug., 1904	8 12 6	8 17 6
Salisbury	100,000	1 0 0	2 0	Dec., 1904	2 0 0	2 2 6
Village Main Reef	400,000	1 0 0	4 0	July, 1904	7 2 6	7 7 6
Wemmer	80,000	1 0 0	12 6	Dec., 1904	10 15 0	11 0 0

*Ex-dividend.

LONDON (By Cable).*

Company.	Nov. 22			Nov. 30			Company.	Nov. 22			Nov. 30		
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Camp Bird	1	9	0	†1	8	7½	Esperanza		19	6		†19	6
Con. Gold Fields	7	7	6	8	1	3	Modderfontein	9	16	3	11	1	3
DeBeers	18	7	6	18	7	6	Rand Mines	11	2	6	11	10	10
Dolores	1	5	0	1	6	6	Rio Tinto	61	12	6	62	0	0
East Rand	8	16	3	9	2	6	Simmer & Jack	1	19	4½	2	3	9
El Oro	1	1	3	1	1	10½	Tomboy	1	6	3	1	6	3

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York. †Ex-dividend.

PARIS.

Company.	Location.	Capital Stock.	Par value.	Latest dividend.	Prices. Opening.	Prices. Closing.
		Francs.	Fr.	Fr.	Fr.	Fr.
Anzin, Coal	France	....	....	290.00	5,725.00	5,710.00
Boleo, c	Lower Cal.	12,000,000	500	104.17	2,245.00	2,260.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	16.75	16.75
Courrieres, Coal	France	600,000	500	110.00	2,910.00	2,949.00
Fraser River, g	Brit. Col	250,000	25	....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	92.75	93.75
Laurium, z, l	Greece	16,300,000	500	25.00	309.00	309.00
Malfidano, z	Italy	12,500,000	500	50.00	625.00	630.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	510.00	505.00
Mokta-el-Hadid, i, l	Algeria	18,312,000	500	40.00	1,022.00	1,010.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	639.00	610.00
Penarroya, Coal	Spain	....	500	45.00	1,130.00	1,136.50
Vielle Montagne, z	Belgium	9,000,000	30	30.00	778.00	778.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.

DIVIDENDS.

GOLD, SILVER, LEAD, QUICKSILVER AND ZINC COMPANIES—UNITED STATES.

Name and Location of Company.	Author-ized Capital.	Shares. Issued.	Par Val $	Dividends. Paid in 1904.	Total to Date.	Latest. Date.	Amt.
Acacia, g. ..... Colo.	$1,500,000	1,443,000	1	.....	$57,560	Apr. 1903	$0.01
Adams, s.l.c. ..... Colo.	1,500,000	150,000	10	.....	738,500	Oct. 1902	.05
Alaska-Mexican, g. Alaska	1,000,000	180,000	5	$135,000	708,381	Oct. 1904	.30
Alaska-Treadwell, g Alaska	5,000,000	200,000	25	525,000	5,570,000	Oct. 1904	1.00
Amalgamated, c .. Mont.	155,000,000	1,530,879	100	3,077,720	25,812,127	Nov. 1904	.50
Am. Sm. & Ref., com U. S.	50,000,000	500,000	100	2,500,000	2,500,000	Oct. 1904	1.25
Am. Sm & Ref. pf. . U. S.	50,000,000	500,000	100	3,500,000	15,891,553	Oct. 1904	1.75
Anaconda, c. ..... Mont.	30,000,000	1,200,000	25	1,200,000	24,450,000	Nov. 1904	.50
Annie Laurie, g. .... Utah.	5,000,000	25,000	100	150,000	425,000	Nov. 1904	.50
Arizona, c. ..... Ariz.	3,775,000	.....	.....	821,245	5,489,503	Oct. 1904	.....
Bald Butte, g.s. .... Mont.	250,000	200,000	1	25,000	1,337,148	Jan. 1904	.12½
Big Six, s.l. ..... Colo.	500,000	500,000	1	.....	17,500	Nov. 1903	.00½
Bonanza King, g. .. Colo.	1,000,000	1,000,000	1	5,000	5,000	Feb. 1904	.00½
Boston & Colo. Sm Colo.	750,000	15,000	50	.....	402,350	Oct. 1902	.75
Boston & Mont .. Mont.	3,750,000	150,000	25	1,050,000	29,375,000	July 1904	3.00
Bree ce, l.s. ..... Colo.	5,000,000	200,000	25	.....	200,000	June 1903	.05
Bunker Hill & Sull. Idaho	3,000,000	309,000	10	663,000	2,189,000	Nov. 1904	.25
Butler-Liberal, g.s. Utah.	500,000	500,000	1	.....	2,500	Dec. 1903	.00½
Butte & Boston, c . Mont.	2,500,000	200 000	25	200.000	1,800,000	Feb. 1904	1.00
Calumet & Arizona, c Ariz.	2,500,000	200 000	10	1,300,000	1,700,000	Dec. 1904	2.00
Calumet & Hecla, c Mich.	2,500,000	100,000	25	4,000,000	87,350,000	Dec. 1904	10.00
Camp Bird, g. ..... Colo.	5,500,000	820,000	5	787,200	1,754,904	Nov. 1904	.18
Cashier. ..... Colo	1,000,000	900,000	1	8,340	26,160	Apr. 1904	.00½
Center Creek, l.z. ... Mo.	1,000,000	10,000	10	40,000	170,000	Oct. 1904	.10
Central Eureka, g . Cal.	4,000,000	398,425	10	191,253	427,238	Nov. 1904	.05
Central, l. ..... Mo.	1,000,000	10,000	100	45,000	430,000	Nov. 1904	.50
Century, g.s.l ..... Utah.	150,000	150,000	1	21,000	28,000	July 1904	.02
C. K. & N., g. ..... Colo.	1,500,000	1,431,900	1	143,190	214,785	Nov. 1904	.01
Clinton, g.s. ..... Colo.	100,000	1,000	100	.....	60,000	Dec. 1903	.30
Con. Mercur, g .... Utah.	5,000,000	1,000,000	5	.....	1,030,000	May 1903	.03
Continental, z. ..... Mo.	550,000	22,000	25	35,200	88,000	Oct. 1904	.40
Creede United, g... Colo.	500,000	500,000	1	50,000	105,000	Oct. 1904	.02
Daly-West, g.s.l. .. Utah.	3,600,000	180,000	20	972,000	4,463,000	Nov. 1904	.40
De Lamar, g.s .... Idaho	400,000	67,180	5	56,430	2,796,770	Oct. 1904	.48
Deadwood-Stand, pf So. Dak.	600,000	600,000	1	.....	6,000	Dec. 1903	.01
Doe Run, l. ..... Mo.	1,500,000	15,000	100	90,000	717,072	Oct. 1904	1.50
Elkton Con., g .... Colo.	3,000,000	2,500,000	1	.....	1,404,461	Mar. 1902	.04
El Paso, g. ..... Colo.	2,560,000	2,450,000	1	159,250	323,550	Oct. 1904	.02
Federal Sm., com . Idaho	10,000,000	50,000	100	157,500	157,500	Sept. 1904	1.50
Federal Sm., pf ... Idaho	20,000,000	100,000	100	551,250	735,000	Sept. 1904	1.75
Gemini, g.s.l ..... Utah.	500,000	5,000	100	150,000	1,200,000	Oct. 1904	10.00
Gold Coin, g ..... Colo.	1,000,000	1,000,000	1	.....	1,230,000	Jan. 1903	.01
Gold King ..... Colo.	1,000,000	936,850	1	23,422	482,478	Nov. 1904	.01
Golden Cycle, g ... Colo.	2,000,000	1,500,000	1	.....	303,750	Aug. 1903	.03
Grand Central, g .. Utah.	250,000	250,000	1	175,000	1,066,250	Aug. 1904	.10
Gwin, g. ..... Cal.	1,000,000	100,000	10	.....	246,500	Dec. 1902	.15
Hecla, s.l. ..... Idaho	250,000	1,000,000	¼	30,000	150,000	May 1904	.01
Hercules-Horsh'e, g Cal.	1,000,000	340,000	1	2,250	2,250	June 1904	.00½
Homestake, g. .... So. Dak.	21,840,000	218,400	100	600,600	12,968,350	Nov. 1904	.25
Horn Silver, g.s.c.z.l Utah.	10,000,000	400,000	25	60,000	5,422,000	Sept. 1904	.05
Iowa, g.s.l. ..... Colo.	1,666,667	1,666,667	1	66,668	403,505	Oct. 1904	.01
Iron Silver. ..... Colo.	10 000,000	500,000	20	250,000	3,100,000	Oct 1904	.10
Jamison, g ..... Cal.	3,900,000	390,000	10	46,800	167,700	Oct. 1904	.03
Kendall, g. ..... Mont.	2,500,000	500,000	5	350,000	655,000	Nov. 1904	.05
Liberty Bell, g .... Colo.	700,000	130,349	1	39,104	130,337	Apr. 1904	.15
Lightner, g. ..... Cal.	125,000	102,255	1	60,791	247,406	Nov. 1904	.05
Lyon, z.l. ..... Mo.	50,000	4,000	10	1,200	1,200	Apr. 1904	.30
Mammoth, g s.l. .... Utah.	10,000,000	400,000	25	60,000	1,920,000	Nov. 1904	.05
Mary McKinney, g. Colo.	1,000,000	1,000,000	1	90,000	650,000	Oct. 1904	.03
Mine La Motte, l. .. Mo.	3,300,000	300,000	10	60,000	300,000	Jan. 1904	.20
Mines Co. of Am... U. S.	2,000,000	2,000,000	1	330,000	795,000	Nov. 1904	.01½
Modoc, g.s. ..... Colo.	500,000	500,000	1	.....	270,000	Dec. 1903	.01
Mont. Ore Purch... Mont.	2,500,000	81.000	25	486,000	3,780,000	Nov. 1904	2.00
Mont.-Tonopah, g . Nev.	1,000,000	885,000	1	.....	42,750	Dec. 1903	.05
Mountain, c. ..... Cal.	6,250,000	250,000	25	.....	3,776,250	May 1903	1.57
Nat. Lead, pf ..... U. S.	15,000,000	149,040	100	1,043,280	15,015,448	Dec. 1904	1.75
Nevada Keystone, g Nev.	1,000,000	638,877	1	19,166	61,790	Feb. 1904	.03
New Century, z .... Mo.	150,000	150,000	1	9,750	9,750	Dec. 1904	.01
New Idria, q. ..... Cal.	500,000	100,000	5	150,000	670,000	Oct. 1904	.30
New Jersey, z. .... U. S.	10,000,000	100,000	100	1,200,000	7,200,000	Nov. 1904	3.00
North Star, g. ..... Cal.	2,500,000	250,000	10	62,500	768,856	July 1904	.25
Northern Light, g.s Utah.	2,000,000	400,000	5	20,000	20,000	Feb. 1904	.05
Old Gold. g. ..... Colo.	2,101,150	2,101,150	1	10,506	10,506	Mar. 1904	.00½
Ontario, s.l. ..... Utah.	15,000,000	150,000	100	.....	14,917,000	Dec. 1902	.30
Ophir, g.s. ..... Nev.	302,406	100,800	3	221,850	1,797,400	July 1904	.25
Osceola, c ..... Mich.	2,500,000	96,150	25	192,300	4,439,600	July 1904	1.00
Oustomah, g. ..... Cal.	250,000	250,000	1	12,500	12,500	Mar. 1904	05
Parrot, c. ..... Mont.	2,300,000	229,850	10	229,850	6,002,785	Dec. 1904	.50
Pennsylvania, g. .. Cal.	5,150,000	51,500	100	51,650	243,725	Nov. 1904	.10
Portland, g ..... Colo.	3,000,000	3,000,000	1	720,000	5,377,080	Oct. 1904	.06
Quicksilver, pf. .... Cal.	4,300,000	43,000	100	.....	1,931,411	May 1903	.50
Quilp, g. ..... Wash.	1,500,000	1,500,000	1	15,000	15,000	Apr. 1904	.01
Quincy, c ..... Mich.	2,500,000	100,000	25	500,000	14,620,000	Aug. 1904	2 50
Red Bird, g.s.c.l. .. Mont.	1,500,000	300,000	5	33,000	69,000	Nov. 1904	.01
Rob Roy, z. ..... Mo.	15,000	13,825	1	692	2,945	May 1904	.03
Rocco Homest'k, l.s Nev.	300,000	300,000	1	4,000	94,000	Jan. 1904	.01
Sacramento, g ..... Utah.	5,000,000	1,000,000	5	20,000	213,000	Aug. 1904	.00½
Salvator, g.s.l. .... Utah.	200,000	200,000	1	6,500	6,500	Aug. 1904	.01
St. Joseph, l. ..... Mo.	6,000,000	375,000	10	168,750	4,003,250	Sept. 1904	.15
Silver Hill, g.s .... Nev.	180,000	180,000	1	18,000	46,800	Mar. 1904	.05
Silver King, g.s.l . Utah.	3,000,000	150,000	20	1,200,000	8,550,000	Nov. 1904	.66⅔
South Swansea, ... Utah.	300,000	300 000	1	3,000	168,000	Apr. 1904	.01
Spearfish, g., pf ... So. Dak.	1,000,000	882,000	1	13,230	110,250	Oct. 1904	.00½
Specie Payment, g. Colo.	1,000,000	1,000,000	1	.....	65,190	Oct. 1903	.01
Standard Con., g.s. Cal.	2,000,000	178,394	10	.....	1,160,331	Sept. 1903	10
Standard, c. ..... Ariz.	500,000	500,000	1	.....	40,000	Sept. 1903	.05
Stratton's Independ Colo.	5,500,000	1,000,007	5	125,001	4,270,860	Dec. 1904	.12½
Tamarack, c. ..... Mich.	1,500,000	60,000	25	90,000	8,580,000	Jan. 1904	1.50
Tennessee, c. ..... Tenn.	5,000,000	175,000	25	218,750	437,500	Jan. 1904	1.25
Tetro, g.l. ..... Utah.	300,000	300,000	1	18,000	18,000	Dec. 1904	.01
Tomboy, g.s. ..... Colo.	1,500,000	300,000	5	.....	1,244,000	July 1902	.24
Tonopah Alpine, g. Nev.	700,000	700,000	1	.....	70,000	Dec. 1903	.10
Town Topics, g s.. Colo.	1,000,000	1,000,000	1	.....	50,000	Nov. 1903	.00½
Uncle Sam. ..... Utah.	200,000	200,000	1	10,000	55,000	Oct. 1904	.02½
United, c., pf ..... Mont.	5,000,000	50,000	100	300,000	750,000	Nov. 1904	3.00
United, z.l., com... Mo.	5,000,000	78,900	5	.....	30,725	Oct. 1903	.05
United, z.l., pf.... Mo.	1,000,000	18,098	25	28,497	153,853	Oct. 1904	.50
United (Cripple C'k) Colo.	5,000,000	4,000,100	1	20,046	339,979	Dec. 1904	.00½
United Verde, c. .. Ariz.	3,000,000	300,000	10	1,800,000	16,860,322	Nov. 1904	.75
U.S.Red.&Ref.,cm Colo.	6,000,000	59,188	100	.....	414,078	Oct. 1903	1.00
U.S.Red.&Ref., pf. Colo.	4,000,000	39,458	100	.....	492,821	Oct. 1903	1.50
United States, g.s.c Utah.	21,500,000	480,000	25	210,000	210,000	Aug. 1904	.50
Utah, g ..... Utah.	1,000,000	100,000	10	4,000	225,000	June 1904	.01
Utah Con., c. ..... Utah.	1,500,000	300,000	5	900,000	2,586,000	July 1904	1.50
Vindicator Con., g. Colo.	1,500,000	1,100,000	1	99,000	1,214,000	Oct. 1904	.03
Waldorf, g ..... Colo.	3,000,000	3,000,000	1	60,000	75,000	Nov. 1904	.00½
Wasp No. 2, g..... So. Dak.	500,000	147,900	1	16,269	234,679	June 1904	.03
Wolverine, c. ..... Mich.	1,500,000	60,000	25	450,000	1,770,000	Oct. 1904	4.00
Yellow Aster, g ... Cal.	1,000,000	100,000	10	30,000	583,789	Feb. 1904	.15

COAL, IRON AND OTHER INDUSTRIALS—UNITED STATES.

Name and Location of Company.	Author-ized Capital.	Shares. Issued.	Par Val $	Dividends. Paid in 1904.	Total to Date.	Latest. Date.	Amt.
Ala. Con., C.& I., pf Ala.	$2,500,000	$24,638	100	$172,468	$862,148	Dec. 1904	$1.75
Allis-Chalmers, pf.. U. S.	25,000,000	200,000	100	350,000	3,213,750	Feb. 1904	1.75
Alma Oil. ..... Cal.	400,000	400,000	1	12,000	57,600	Nov. 1904	.03
Amer. Ag. Chem., pf. U. S.	20,000,000	181,350	100	1,071,980	5,542,740	Oct. 1904	3.00
American Cement. Pa.	2,000,000	200,000	10	160,000	700,000	July 1904	.40
American Coal. ... Md.	1,500,000	50,000	25	125,000	1,557,500	Sept. 1904	1.25
Bon Air C. & I., pf. Tenn.	2,500,000	18,803	100	84,615	221,551	July 1904	1.50
Cambria Steel. .... Pa.	50,000,000	900,000	50	1,350,000	7,800,000	Aug. 1904	.75
Caribou Oil. ..... Cal.	100,000	80,000	1	11,200	11,200	Nov. 1904	.07
Central C.&C., com. Mo.	5,125,000	51,250	100	307,500	858,750	Oct. 1904	1.50
Central C.& C., pf. Mo.	1,875,000	18,750	100	93,748	890,620	Oct. 1904	1.25
Central Oil ..... W. Va.	1,500,000	60,000	25	45,000	197,500	Aug. 1904	.25
Claremont Oil .... Cal.	500,000	450,000	1	27,000	27,000	Nov. 1904	.01
Colo. Fuel & I., pf. Colo.	2,000,000	20,000	100	.....	1,560,000	Feb. 1903	4.00
Colum. & Hock. C&I Ohio	70,000,000	69,244	100	51,933	138,464	Aug. 1904	.25
Consolidated Coal . Ill.	5,000,000	50,000	100	150,000	450,000	July 1904	1.00
Consolidation Coal. Md.	10,250,000	102,500	100	410,000	6,946,650	Feb. 1904	4.00
Crucible Steel, pf. . U. S.	25,000,000	250,000	100	.....	5,250,000	Sept. 1903	1.75
Dabney Oil. ..... Cal.	1,200,000	1,000,000	1	37,500	182,500	Feb. 1904	.03¾
Empire S. & I., pf . U. S.	5,000,000	23,700	100	44,550	611,900	July 1904	1.50
Esperanza Oil. .... Cal.	125,000	125,000	1	2,500	2,500	Oct. 1904	.01
Fairmont Coal .... W. Va.	12,000,000	120,000	100	240,000	240,000	Feb. 1904	2.00
Four Oil ..... Cal.	500,000	208,700	1	22,957	83,319	Nov. 1904	.01
General Chem., com U. S.	12,500,000	74,103	100	.....	1,300,507	Dec. 1903	1.25
General Chem., pf . U. S.	12,500,000	100,000	100	150,000	3,325,178	Jan. 1905	1.50
Giant Oil. ..... Cal.	800,000	800,000	1	.....	144,000	Jan. 1904	.02
Home Oil ..... Cal.	100,000	100,000	1	15,000	507,500	Oct. 1904	.02½
Houston Oil, pf .... Tex.	7,500,000	75,000	100	.....	896,500	Feb. 1903	3.00
Imperial Oil ..... Cal.	1,000,000	100,000	100	220,000	720,000	Nov. 1904	.20
Ill. Crude Oil. ..... Cal.	200,000	200,000	1	10,000	10,000	Nov. 1904	.01½
Jeff. & Cl'f. C. & I. com. Pa.	1,500,000	15,000	100	75,000	225,000	Aug. 1904	5.00
Jeff. & Cl'f. C. & I., pf Pa.	1,500,000	15,000	100	75,000	675,000	Aug. 1904	2.50
Keystone Oil .... Colo.	2,000,000	2,000,000	1	8,000	8,000	July 1904	.00½
Lehigh Coal & Nav. Pa.	14,346,650	286,933	50	1,004,266	22,045,715	Nov. 1904	1.75
Maryland Coal, pf . Md.	2,000,000	18,850	50	65,975	1,122,110	June 1904	3.00
Monong. R. Coal, pf Pa.	10,000,000	97,300	100	65,975	3,124,485	Jan. 1904	3.50
Monte Cristo Oil . . Cal.	500,000	500,000	1	45,000	80,000	Nov. 1904	.01
National Carbon, pf U. S.	4,500,000	45,000	100	315,000	1,890,000	Nov. 1904	1.75
New Central Coal. . Md.	1,000,000	50,000	20	20,000	270,000	Mar. 1904	.40
Ohio & Ind. Gas. . . U. S.	10,000,000	900,000	100	.....	1,440,000	Dec. 1903	1.00
Oil City Petroleum Cal.	500,000	500,000	1	20,000	20,000	Nov. 1904	.00½
Pacific Coast Borax Cal.	2,000,000	19,000	100	381,000	1,915,500	Nov. 1904	1.00
Peerless Oil. ..... Cal.	1,000,000	92,000	10	128,720	319,120	Nov. 1904	.14
Penna. Salt. ..... Pa.	3,000,000	60,000	50	360,000	13,810,000	Oct. 1904	3.00
Penna. Steel. ..... Pa.	25,000,000	168,214	100	1,177,498	4,683,248	Nov. 1904	3.50
Phila. Gas, com ... Pa.	28,953,029	579,061	50	1,595,552	5,012,383	Nov. 1904	.75
Phila. Gas, pf. .... Pa.	5,744,813	114,896	50	287,212	1,439,885	June 1904	1.25
Pittsburg Coal, pf . Pa.	32,000,000	297,012	100	2,079,084	10,395,420	Oct. 1904	1.75
Pittsburg Oil ..... Cal.	300,000	240,000	1	.....	48,000	Dec. 1903	.02½
Pocahontas Coll., pf W. Va.	1,500,000	15,000	100	82,500	272,500	Nov. 1904	.50
Rep. Iron & Steel, pf U. S.	25,000,000	204,169	100	.....	6,053,476	Oct. 1903	1.75
San Joaquin Oil. . . Cal.	100,000	100,000	1	440,000	625,000	Mar. 1904	2.20
Shelby Iron ..... Ala.	1,000,000	10,000	100	.....	840,000	Nov. 1903	5.00
Sloss-Sheffield, pf . Ala.	20,000,000	67,000	100	469,000	2,205,000	Oct. 1904	1.75
Somerset Coal . . . Pa.	4,000,000	40,000	100	80,000	80,000	Feb. 1904	2.00
St. Bernard C. & C. Ky. Ten	1,000,000	10,000	100	.....	770,000	Dec. 1903	6.00
Standard Oil ..... U. S.	100,000,000	970,000	100	34,920,000	242,900,000	Dec. 1904	7.00
Tenn. C. I., pf. .... Tenn.	248,000	2,480	100	19,840	326,944	Nov. 1904	2.00
Texas & Pacific Coal Texas.	2,000,000	20,000	100	30,000	1,890,000	Oct. 1904	1.50
Thirty-three Oil. . . Cal.	500,000	100,000	5	110,000	350,000	Nov. 1904	.10
Thomas Iron . . . Pa.	2,500,000	25,000	200	.....	200,000	Aug. 1903	4.00
Union Oil ..... Cal.	10,000,000	52,672	100	147,480	963,422	Oct. 1904	.70
Union Nat'l Gas. . . Pa.	8,000,000	22,500	100	180,000	360,000	Oct. 1904	2.00
U.S. Steel Corp., cm U. S.	550,000,000	5,083,025	100	.....	53,360,978	Dec. 1903	1.50
U.S. Steel, Corp. pf. U. S.	360,281,100	3,602,811	100	25,220,832	118,097,735	Nov. 1904	1.75
Va. Carolina Ch., cm U. S.	38,000,000	279,844	100	.....	3,678,829	June 1903	1 25
Va. Carolina Ch., pf. U. S.	20,000,000	180,000	100	1,200,000	8,220,869	Oct. 1904	2.00
Westmoreland Coal Pa.	3,000,000	60,000	50	30,000	8,280,000	Oct. 1904	.50
West Shore Oil. ... Cal.	100,000	100,000	1	40,000	145,000	Nov. 1904	.05

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.	Author-ized Capital.	Shares. Issued.	Par Val $	Dividends. Paid in 1904.	Total to Date.	Latest. Date.	Amt.
Amistad y Conc'dia Mex.	$480,000	9,600	50	$76,362	$241,648	Oct. 1904	$1.55
Barreno, g.s ..... Mex.	12,000	2,400	5	6,036	69,982	Sept. 1904	.90
Bart. de Medina Mil Mex.	50,000	2,000	25	17,498	97,226	Nov. 1904	.70
Butters' Salvador, g Salv.	750,000	150,000	5	150,000	525,000	Oct. 1904	.25
Cariboo McKin'y, gs B. C.	1,250,000	1,250,000	1	50,000	546,837	Feb. 1904	.04
Carmen, g.s ..... Mex.	27,500	11,100	25	5,038	83,654	Oct. 1904	2.29
Carmen-Guanaj. g.s Mex.	725,000	145,000	5	.....	27,750	Oct. 1903	.12½
Cinco Senores. .... Mex.	.....	2,000	...	.....	711,935	July 1903	4.10
Copiapo, c. ..... Chile	1,125,000	112,500	10	135,000	3,000,900	Oct. 1904	1.20
Crow's Nest Pass. . N. S.	3,500,000	121,486	25	172,524	968,947	Apr. 1904	2.50
Dominion Coal, com N. S.	15,000,000	150,000	100	.....	1,050,000	Dec. 1903	1.75
Dominion Coal, pf. N. S.	3,000,000	30,000	100	120,000	2,400,000	July 1904	4.00
Dominion I.&S., pf. N. S.	5,000,000	50,000	100	.....	875,000	Sept. 1903	3.50
Dos Estrellas, g.s. . Mex.	150,000	3,000	50	148,350	731,175	Nov. 1904	4.60
El Oro, g.s ..... Mex.	5,750,000	1,080,000	5	194,400	2,708,800	July 1904	.18
Esperanza, s.g ..... Mex.	2,275,000	455,000	5	222,950	1,377,149	Oct. 1904	.12
Fraternal, s ..... Mex.	5,000	1,000	5	35,250	86,513	Oct. 1904	5.75
Granby Con ..... B. C.	13,363,030	1,336,303	10	.....	133,630	Dec. 1903	.10
Greene Con., c .... Mex.	8,640,000	864,000	10	1,123,200	1,775,020	Dec. 1904	.40
Guggenheim Expl . Mex.	17,000,000	105,000	100	735,000	1,286,250	Oct. 1904	1.75
Le Roi No. 2, g. .... B. C.	3,000,000	120,000	35	57,600	345,600	June 1904	.24
Mex. Coal & Coke . Mex.	5,000,000	50,000	100	300,000	300,000	Dec. 1904	3.00
Natividad, s.g .... Mex.	36,000	2,400	15	132,000	404,463	Nov. 1904	5.00
N.Y.& Hond. Ros.. C. A.	1,500,000	150,000	10	135,000	1,920,000	Nov. 1904	.10
N. S. St.&Coal, com. N. S.	5,000,000	50,000	100	273 600	788,600	Nov. 1904	1.00
N. S. St.& Coal, pf. N. S.	2,000,000	10,300	100	61,600	267,800	Nov. 1904	2.00
Penoles, s.g. ..... Mex.	125,000	2,500	50	495,250	2,983,364	Nov. 1904	18.30
Providence, g.s .... B. C.	200,000	40.000	5	20,000	22,224	Oct. 1904	.10
Real del Monte.... Mex.	.....	2,554	...	34,479	2,961,363	Oct. 1904	4.60
San Francisco Mill. Mex.	150,000	6,000	25	26,100	313,260	Nov. 1904	.93
San Rafael ..... Mex.	60,000	2,400	25	267,425	2,303,942	Nov. 1904	.....
Soledad, s.l. ..... Mex.	19,200	960	20	76,198	340,840	Nov. 1904	13.95
Sopressa, g.s. ..... Mex.	19,200	960	20	25,928	225,994	Nov. 1904	2.33
Sta. Gertrudis, g.s. Mex.	1,920,000	38,000	50	81,184	2,861,344	Sept. 1904	.....
St. John del Rey, g. Brazil	3,000,000	546,265	5	69,152	14,228,101	Dec. 1904	.12
Sta. Maria de la Paz Mex.	.....	2,400	...	38,026	2,000,399	Oct. 1904	2.30
St. Eugene Con.... B. C.	3,500,000	3,202,000	1	64,040	274,040	Dec. 1904	.02
Tyee, c. ..... B. C.	940,000	180,000	5	43,200	43,200	Apr. 1904	.24
Union Mill ..... Mex.	150,000	3,000	50	59,663	473,086	Oct. 1904	2.30

NOTE: These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list.